ELEMENTARY
# CORE Academy

UTAH STATE OFFICE OF EDUCATION & UTAH STATE UNIVERSITY

3RD GRADE

# 2008 Participant Handbook

UTAH STATE OFFICE OF EDUCATION

UtahState UNIVERSITY


**ELEMENTARY CORE ACADEMY**

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1-890563-56-0

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# Acknowledgements

These materials have been produced by and for the teachers of the State of Utah. Appreciation is expressed to the numerous individuals who provided input and effort into the creation of this curriculum. Delivery of the Elementary CORE Academy, including the development and delivery of content, coordination of sessions, distribution of materials, and participant interaction, has been a collaborative effort of many educational groups across Utah. The following organizations, Utah teachers, and educational leaders contributed ideas and activities as part of this professional development project:

## Organizations:

Utah State Office of Education (USOE)
Utah State University (USU)
State Science Education Coordination Committee (SSECC)
State Mathematics Education Coordination Committee (SMECC)
Special Education Services Unit (USOE)

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Credits for editing, compiling, formatting, and assisting with the materials and delivery of the Elementary CORE Academy are given to Brynja Kohler and Elizabeth Shaw.

# UTAH STATE OFFICE OF EDUCATION

Leadership…Service…Accountability

Patti Harrington, Ed.D. State Superintendent of Public Instruction
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Dear CORE Academy Teachers:

Thank you for your investment in children and in building your own expertise as you participate in the Elementary CORE Academy. I hope your involvement helps you to sustain a laser-like focus on student achievement.

Teachers in Utah are superb. By participating in the Academy, you join a host of teachers throughout the state who understand that teaching targeted on the core curricula, across a spectrum of subjects, will produce results of excellence. The research is quite clear–the closer the match of explicit instruction to core standards, the better the outcome on core assessments.

I personally appreciate your excellence and your desire to create wonderful classrooms of learning for students. Thank you for your dedication. I feel honored to associate with you and pledge my support to lead education in ways that benefit all of our children.

Sincerely,

Patti Harrington, Ed.D.
State Superintendent of Public Instruction


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# Funding Sources

Appreciation is expressed for the tremendous educational input and monetary commitment of several organizations for the successful delivery of the Elementary CORE Academy. This year's Elementary CORE Academy was developed and funded through a variety of sources. The Utah State Office of Education (USOE), in collaboration with Utah State University (USU) and local school districts of Utah, have supported kindergarten through sixth grade teachers with professional development experiences that will enhance the educational experience for Utah children.

Major funding for the Academy comes from the following sources:

## Federal/State Funds:

Utah State Office of Education
- Staff Development Funds
- Special Education Services Unit

ESEA Title II

Utah Math Science Partnership

## District Funds:

Various sources including Quality Teacher Block, Federal ESEA Title II, and District Professional Development Funds

## School Funds:

Trust land, ESEA Title II, and other school funds
Utah State Office of Education Special Education Services

The state and district funds are allocations from the state legislature. ESEA is part of the "No Child Left Behind" funding that comes to Utah.

Additionally, numerous school districts, individual schools, and principals in Utah have sponsored teachers to attend the Academy. Other educational groups have assisted in the development and delivery of resources in the Academy.

Most importantly are the thousands of teachers who take time from their summer to attend these professional development workshops. It is these teachers who make this program possible.

# Goals of the Elementary CORE Academy

## Overall

The purpose of the Elementary CORE Academy is to create high quality teacher instruction and improve student achievement through the delivery of professional development opportunities and experiences for teachers across Utah.

## The Academy will provide elementary teachers in Utah with:

1. Models of exemplary and innovative instructional strategies, tools, and resources to meet the Core Curriculum standards, objectives, and indicators.
2. Practical models and diverse methods of meeting the learning needs of all children, with instruction implementation aligned to the Core Curriculum.
3. Meaningful opportunities for collaboration, self-reflection, and peer discussion specific to innovative and effective instructional techniques, materials, teaching strategies, and professional practices in order to improve classroom instruction.

Learning a limited set of facts will no longer prepare a student for real experiences encountered in today's world. It is imperative that educators have continued opportunities to obtain instructional skills and strategies that provide methods of meeting the needs of all students. Participants of the Academy experience will be better equipped to meet the challenges faced in today's classrooms.

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# Utah Elementary Mathematics Core Curriculum

## Introduction

Most children enter school confident in their own abilities; they are curious and eager to learn more. They make sense of the world by reasoning and problem solving. Young students are building beliefs about what mathematics is, about what it means to know and do mathematics, and about themselves as mathematical learners. Students use mathematical tools, such as manipulative materials and technology, to develop conceptual understanding and solve problems as they do mathematics. Students, as mathematicians, learn best through participatory experiences throughout the instruction of the mathematics curriculum.

- Mathematics instruction needs to include more than short-term learning of rote procedures.

Recognizing that no term captures completely all aspects of expertise, competence, knowledge, and facility in mathematics, the term *mathematical proficiency* has been chosen to capture what it means to learn mathematics successfully. Mathematical proficiency has five strands: computing (carrying out mathematical procedures flexibly, accurately, efficiently, and appropriately), understanding (comprehending mathematical concepts, operations, and relations), applying (ability to formulate, represent, and solve mathematical problems), reasoning (logically explaining and justifying a solution to a problem), and engaging (seeing mathematics as sensible, useful, and doable, and being able to do the work) (NRC, 2001).

The most important observation about the five strands of mathematical proficiency is that they are interwoven and interdependent. This observation has implications for how students acquire mathematical proficiency, how teachers develop that proficiency in their students, and how teachers are educated to achieve that goal. At any given moment during a mathematics lesson or unit, one or two strands might be emphasized. But all the strands must eventually be addressed so that the links among them are strengthened. The integrated and balanced development of all five strands of mathematical proficiency should guide the teaching and learning of school mathematics. Instruction should not be based on the extreme positions that students learn solely by internalizing what a teacher or book says, or solely by inventing mathematics on their own.

The Elementary Mathematics Core describes what students should know and be able to do at the end of each of the K-6 grade levels. It was developed and revised by a community of Utah mathematics

teachers, mathematicians, university mathematics educators, and State Office of Education specialists. It was critiqued by an advisory committee representing a wide variety of people from the community, as well as an external review committee. The Core reflects the current philosophy of mathematics education that is expressed in national documents developed by the National Council of Teachers of Mathematics, the American Association for the Advancement of Science, and the National Research Council. This Mathematics Core has the endorsement of the Utah Council of Teachers of Mathematics. The Core reflects high standards of achievement in mathematics for all students.

## Organization of the Elementary Mathematics Core

The Core is designed to help teachers organize and deliver instruction.

- Each grade level begins with a brief description of areas of instructional emphasis which can serve as organizing structures for curriculum design and instruction.
- The INTENDED LEARNING OUTCOMES (ILOs) describe the skills and attitudes students should acquire as a result of successful mathematics instruction. They are found at the beginning of each grade level and are an integral part of the Core.
- A STANDARD is a broad statement of what students are expected to understand. Several Objectives are listed under each Standard.
- An OBJECTIVE is a more focused description of what students need to know and be able to do at the completion of instruction. If students have mastered the Objectives associated with a given Standard, they have mastered that Standard at that grade level. Several Indicators are described for each Objective.
- INDICATORS are observable or measurable student actions that enable students to master an Objective. Indicators can help guide classroom instruction.
- MATHEMATICAL LANGUAGE AND SYMBOLS STUDENTS SHOULD USE includes language and symbols students should use in oral and written language.
- EXPLORATORY CONCEPTS AND SKILLS are included to establish connections with learning in subsequent grade levels. They are not intended to be assessed at the grade level indicated.

# Guidelines Used in Developing the Elementary Mathematics Core

## The Core is:

### Consistent With the Nature of Learning

In the early grades, children are forming attitudes and habits for learning. It is important that instruction maximizes students' potential and gives them understanding of the intertwined nature of learning. The main intent of mathematics instruction is for students to value and use mathematics as a process to understand the world. The Core is designed to produce an integrated set of Intended Learning Outcomes for students.

### Coherent

The Core has been designed so that, wherever possible, the ideas taught within a particular grade level have a logical and natural connection with each other and with those of earlier grades. Efforts have also been made to select topics and skills that integrate well with one another and with other subject areas appropriate to grade level. In addition, there is an upward articulation of mathematical concepts and skills. This spiraling is intended to prepare students to understand and use more complex mathematical concepts and skills as they advance through the learning process.

### Developmentally Appropriate

The Core takes into account the psychological and social readiness of students. It builds from concrete experiences to more abstract understandings. The Core focuses on providing experiences with concepts that students can explore and understand in depth to build the foundation for future mathematical learning experiences.

### Reflective of Successful Teaching Practices

Learning through play, movement, and adventure is critical to the early development of the mind and body. The Core emphasizes student exploration. The Core is designed to encourage a variety of interactive learning opportunities. Instruction should include recognition of the role of mathematics in the classroom, school, and community.

### Comprehensive

By emphasizing depth rather than breadth, the Elementary Mathematics Core seeks to empower students by providing a comprehensive background in mathematics. Teachers are expected to teach all the standards and objectives specified in the Core for their grade level, but may add related concepts and skills.

The Core is:

- Consistent
- Coherent
- Developmentally Appropriate
- Reflective of Successful Teaching Practices
- Comprehensive
- Feasible
- Useful and Relevant
- Reliant Upon Effective Assessment Practices
- Engaging

## Feasible

Teachers and others who are familiar with Utah students, classrooms, teachers, and schools have designed the Core. It can be taught with easily obtained resources and materials. A handbook is also available for teachers and has sample lessons on each topic for each grade level. The handbook is a document that will grow as teachers add exemplary lessons aligned with the new Core.

## Useful and Relevant

This curriculum relates directly to student needs and interests. The relevance of mathematics to other endeavors enables students to transfer skills gained from mathematics instruction into their other school subjects and into their lives outside the classroom.

## Reliant Upon Effective Assessment Practices

Student achievement of the standards and objectives in this Core is best assessed using a variety of assessment instruments. Performance tests are particularly appropriate to evaluate student mastery of mathematical processes and problem-solving skills. Teachers should use a variety of classroom assessment approaches in conjunction with standard assessment instruments to inform instruction. Sample test items, keyed to each Core Standard, may be located on the "Utah Mathematics Home Page" at http://www.usoe.k12.ut.us/curr/math. Observation of students engaged in instructional activities is highly recommended as a way to assess students' skills as well as attitudes toward learning. The nature of the questions posed by students provides important evidence of their understanding of mathematics.

## Based Upon the National Council of Teachers of Mathematics Curriculum Focal Points

In 2006, the National Council of Teachers of Mathematics (NCTM) published *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics* (NCTM, 2006). This document is available online at http://www.nctm.org/focalpoints. This document describes three focal points for each grade level. NCTM's focal points are areas of emphasis recommended for the curriculum of each grade level. The focal points within a grade are ***not the entire curriculum*** for that particular grade; however, Utah's Core Curriculum was designed to include these areas of focus.

# Intended Learning Outcomes for Third through Sixth Grade Mathematics

The main intent of mathematics instruction is for students to value and use mathematics and reasoning skills to investigate and understand the world.

The Intended Learning Outcomes (ILOs) describe the skills and attitudes students should acquire as a result of successful mathematics instruction. They are an essential part of the Mathematics Core Curriculum and provide teachers with a standard for student learning in mathematics.

- ILOs describe the skills and attitudes students should learn as a result of mathematics instruction.

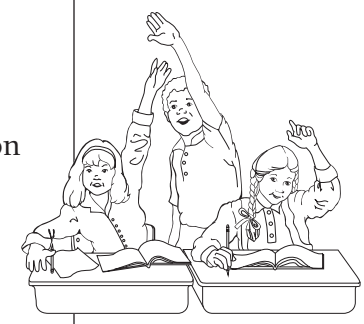
ILOs for mathematics:

1. **Develop a positive learning attitude toward mathematics.**
2. **Become effective problem solvers by selecting appropriate methods, employing a variety of strategies, and exploring alternative approaches to solve problems.**
3. **Reason logically, using inductive and deductive strategies and justify conclusions.**
4. **Communicate mathematical ideas and arguments coherently to peers, teachers, and others using the precise language and notation of mathematics.**
5. **Connect mathematical ideas within mathematics, to other disciplines, and to everyday experiences.**
6. **Represent mathematical ideas in a variety of ways.**

Significant mathematics understanding occurs when teachers incorporate ILOs in planning mathematics instruction. The following are ideas to consider when planning instruction for students to acquire the ILOs:

1. **Develop a positive learning attitude toward mathematics.**

   When students are confident in their mathematical abilities, they demonstrate persistence in completing tasks. They pose mathematical questions about objects, events, and processes while displaying a sense of curiosity about numbers and patterns. It is important to build on students' innate problem-solving inclinations and to preserve and encourage a disposition that values mathematics.



2. **Become effective problem solvers by selecting appropriate methods, employing a variety of strategies, and exploring alternative approaches to solve problems.**

   Problem solving is the cornerstone of mathematics. Mathematical knowledge is generated through problem solving

as students explore mathematics. To become effective problem solvers, students need many opportunities to formulate questions and model problem situations in a variety of ways. They should generalize mathematical relationships and solve problems in both mathematical and everyday contexts.

3. **Reason logically, using inductive and deductive strategies and justify conclusions.**

   Mathematical reasoning develops in classrooms where students are encouraged to put forth their own ideas for examination. Students develop their reasoning skills by making and testing mathematical conjectures, drawing logical conclusions, and justifying their thinking in developmentally appropriate ways. Students use models, known facts, and relationships to explain reasoning. As they advance through the grades, students' arguments become more sophisticated.

4. **Communicate mathematical ideas and arguments coherently to peers, teachers, and others using the precise language and notation of mathematics.**

   The ability to express mathematical ideas coherently to peers, teachers, and others through oral and written language is an important skill in mathematics. Students develop this skill and deepen their understanding of mathematics when they use accurate mathematical language to talk and write about what they are doing. When students talk and write about mathematics, they clarify their ideas and learn how to make convincing arguments and represent mathematical ideas verbally, pictorially, and symbolically.

5. **Connect mathematical ideas within mathematics, to other disciplines, and to everyday experiences.**

   Students develop a perspective of the mathematics field as an integrated whole by understanding connections within mathematics. Students should be encouraged to explore the connections that exist with other disciplines and between mathematics and their own experiences.

6. **Represent mathematical ideas in a variety of ways.**

   Mathematics involves using various types of representations including concrete, pictorial, and symbolic models. In particular, identifying and locating numbers on the number line has a central role in uniting all numbers to promote understanding of equivalent representations and ordering. Students also use a variety of mathematical representations to expand their capacity to think logically about mathematics.

# Third Grade Mathematics Core Curriculum

By the end of grade three, students develop understandings of multiplication and division of whole numbers. They use properties to develop increasingly more sophisticated strategies to solve problems involving basic multiplication and division facts. They relate division to multiplication. Students understand fraction equivalence for simple fractions; they recognize that the size of a fractional part is relative to the size of the whole. They understand meanings of fractions to represent parts of a whole, parts of a set, or distances on a number line. They compare and order simple fractions by using models, benchmark fractions, or common denominators.

Students investigate, analyze, and classify two-dimensional shapes by their sides and angles. They decompose, combine, and transform polygons to understand properties of two-dimensional space and use those properties to solve problems. Students construct and analyze frequency tables, bar graphs, picture graphs, and line plots and use them to solve problems.

**Standard I:** **Students will understand the base-ten numeration system, place value concepts, simple fractions and perform operations with whole numbers.**

*Objective 1:* Represent whole numbers up to 10,000, comprehend place value concepts, and identify relationships among whole numbers using base-ten models and symbolic notation.

a. Read, write, and represent whole numbers using standard and expanded form.

b. Demonstrate multiple ways to represent numbers using models and symbolic representations (e.g., fifty is the same as two groups of 25, the number of pennies in five dimes, or 75 - 25).

c. Identify the place and the value of a given digit in a four-digit numeral and round numbers to the nearest ten, hundred, and thousand.

d. Order and compare whole numbers on a number line and use the symbols <, >, ≠, and = when comparing whole numbers.

e. Identify factors and multiples of whole numbers.

**Standard I:**

**Students will understand the base-ten numeration system, place value concepts, simple fractions and perform operations with whole numbers.**

*Objective 2:* Use fractions to describe and compare parts of the whole.

a. Identify the denominator of a fraction as the number of equal parts of the unit whole and the numerator of a fraction as the number of equal parts being considered.

b. Define regions and sets of objects as a whole and divide the whole into equal parts using a variety of objects, models, and illustrations.

c. Name and write a fraction to represent a portion of a unit whole for halves, thirds, fourths, sixths, and eighths.

d. Place fractions on the number line and compare and order fractions using models, pictures, the number line, and symbols.

e. Find equivalent fractions using concrete and pictorial representations.

*Objective 3:* Model problems involving addition, subtraction, multiplication, and division.

a. Demonstrate the meaning of multiplication and division of whole numbers through the use of a variety of representations (e.g., equal-sized groups, arrays, area models, and equal jumps on a number line for multiplication, partitioning and sharing for division).

b. Use a variety of strategies and tools, such as repeated addition or subtraction, equal jumps on the number line, and counters arranged in arrays to model multiplication and division problems.

c. Demonstrate, using objects, that multiplication and division by the same number are inverse operations (e.g., 3 x ☐ = 12 is the same as 12 ÷ 3 = ☐ and ☐ = 4).

d. Demonstrate the effect of place value when multiplying whole numbers by 10.

e. Write a story problem that relates to a given addition, subtraction, or multiplication equation, and write a number sentence to solve a problem related to the students' environment.

*Objective 4:* Compute and solve problems involving addition and subtraction of 3- and 4-digit numbers and basic facts of multiplication and division.

a. Use a variety of methods to facilitate computation (e.g., estimation, mental math strategies, paper and pencil).

b. Find the sum or difference of numbers, including monetary amounts, using models and strategies such as expanded form, compensation, partial sums, and the standard algorithm.

c. Compute basic multiplication facts (0-10) and related division facts using a variety of strategies based on properties of addition and multiplication (i.e., commutative, associative, identity, zero, and the distributive properties).

**Mathematical language and symbols students should use:**
sum, difference, expanded form, factor, product, array, multiple, numerator, denominator, halves, thirds, fourths, sixths, eighths, divisor, dividend, quotient, greater than, less than, equal to, <, >, =

**Exploratory Concepts and Skills**

- Extend multiplication and division to larger-digit numbers.
- Use concrete objects and visual models to add and subtract common decimals.
- Investigate the distributive property of multiplication over addition for single-digit multipliers (e.g., 7 x 15 is equivalent to 7 x (10 + 5) is equivalent to (7 x 10) + (7 x 5).

**Standard II:** **Students will use patterns, symbols, operations, and properties of addition and multiplication to represent and describe simple number relationships.**

*Objective 1:* Create, represent, and analyze growing patterns.

a. Create and extend growing patterns using objects, numbers, and tables.

b. Describe how patterns are extended using manipulatives, pictures, and numerical representations.

*Objective 2:* Recognize, represent, and simplify simple number relationships using symbols, operations, and properties.

a. Represent numerical relationships as expressions, equations, and inequalities.

b. Solve equations involving equivalent expressions (e.g., 6 + 4 = Δ + 7).

c. Use the >, <, and = symbols to compare two expressions involving addition and subtraction (e.g., 4 + 6 ☐ 3 + 2; 3 + 5 ☐ 16 - 9).

d. Recognize and use the commutative, associative, distributive, and identity properties of addition and multiplication, and the zero property of multiplication.

**Standard II:**

**Students will use patterns, symbols, operations, and properties of addition and multiplication to represent and describe simple number relationships.**

**Mathematical language and symbols students should use:**
growing patterns, expressions, equations, <, >, =

**Exploratory Concepts and Skills**

- Use concrete materials to build an understanding of equality and inequality.
- Explore properties of equality in number sentences (e.g., when equals are added to equals, then the sums are equal; when equals are multiplied by equals, then the products are equal.

**Standard III: Students will describe and analyze attributes of two-dimensional shapes.**

*Objective 1:* Describe and compare attributes of two-dimensional shapes.

a. Identify, describe, and classify polygons (e.g., pentagons, hexagons, octagons).

b. Identify attributes for classifying triangles (e.g., two equal sides for the isosceles triangle, three equal sides for the equilateral triangle, right angle for the right triangle).

c. Identify attributes for classifying quadrilaterals (e.g., parallel sides for the parallelogram, right angles for the rectangle, equal sides and right angles for the square).

d. Identify right angles in geometric figures, or in appropriate objects, and determine whether other angles are greater or less than a right angle.

*Objective 2:* Demonstrate the meaning of congruence through applying transformations.

a. Demonstrate the effect of reflection, translation, or rotation using objects.

b. Determine whether two polygons are congruent by reflecting, translating, or rotating one polygon to physically fit on top of the other.

**Mathematical language and symbols students should use:**
polygon, attribute, quadrilateral, equilateral triangle, isosceles triangle, right triangle, pentagon, hexagon, octagon, parallel, right angle, reflect, translate, rotate, slide, flip, turn, congruent

**Exploratory Concepts and Skills**

- Explore line symmetry and rotational symmetry.
- Investigate two-dimensional representations of three-dimensional objects.
- Explore properties of equality in number sentences (e.g., when equals are added to equals, then the sums are equal; when equals are multiplied by equals, then the products are equal.

**Standard III:**

**Students will describe and analyze attributes of two-dimensional shapes.**

**Standard IV:** **Students will select and use appropriate units and measurement tools to solve problems.**

*Objective 1:* Select and use appropriate tools and units to estimate and measure length, weight, capacity, time, and perimeter of two-dimensional figures.

a. Describe the part-whole relationships (e.g., 3 feet in a yard, a foot is 1/3 of a yard) between metric units of length (i.e., centimeter, meter), and among customary units of length (i.e., inch, foot, yard), capacity (i.e., cup, quart), and weight (i.e., pound, ounce).

b. Measure the length of objects to the nearest centimeter, meter, half- and quarter-inch, foot, and yard.

c. Measure capacity using cups and quarts, and measure weight using pounds and ounces.

d. Identify the number of minutes in an hour, the number of hours in a day, the number of days in a year, and the number of weeks in a year.

e. Describe perimeter as a measurable attribute of two-dimensional figures, and estimate and measure perimeter with metric and customary units.

*Objective 2:* Solve problems involving measurements.

a. Determine simple equivalences of measurements (e.g., 30 inches = 2 feet and 6 inches; 6 cups = 11/2 quarts; 90 min. = 1 hr. 30 min.).

b. Compare given objects according to measurable attributes (i.e., length, weight, capacity).

c. Solve problems involving perimeter.

**Standard IV:**

**Students will select and use appropriate units and measurement tools to solve problems.**

**Mathematical language and symbols students should use:**

measure, unit, metric system, customary system, length, pound, ounce, centimeter, meter, inch, foot, yard, capacity, weight, perimeter

Determine elapsed time in hours (e.g., 7:00 a.m. to 2:00 p.m.)

**Exploratory Concepts and Skills**

- Determine the value of a combination of coins and bills.
- Count back change from a single purchase.

**Standard V: Students will collect and organize data to make predictions and identify basic concepts of probability.**

*Objective 1:* Collect, organize, and display data to make predictions.

a. Collect, read, represent, and interpret data using tables, graphs, and charts, including keys (e.g., pictographs, bar graphs, frequency tables, line plots).

b. Make predictions based on a data display.

*Objective 2:* Identify basic concepts of probability.

a. Describe the results of events using the terms "certain," "likely," "unlikely," and "impossible."

b. Conduct simple probability experiments, record possible outcomes systematically, and display results in an organized way (e.g., chart, graph).

c. Use results of simple probability experiments to describe the likelihood of a specific outcome in the future.

**Mathematical language and symbols students should use:**
data, table, chart, graph, frequency table, line plot, pictograph, bar graph, likely, certain, outcome, impossible outcome

**Exploratory Concepts and Skills**

- Predict outcomes of simple experiments.

**Standard V:**

**Students will collect and organize data to make predictions and identify basic concepts of probability.**

# Utah Elementary Science Core Curriculum

## Introduction

Science is a way of knowing, a process for gaining knowledge and understanding of the natural world. The Science Core Curriculum places emphasis on understanding and using skills. Students should be active learners. It is not enough for students to read about science; they must do science. They should observe, inquire, question, formulate and test hypotheses, analyze data, report, and evaluate findings. The students, as scientists, should have hands–on, active experiences throughout the instruction of the science curriculum.

- Science is a way of knowing, a process for gaining knowledge and understanding of the natural world.

The Elementary Science Core describes what students should know and be able to do at the end of each of the K–6 grade levels. It was developed, critiqued, piloted, and revised by a community of Utah science teachers, university science educators, State Office of Education specialists, scientists, expert national consultants, and an advisory committee representing a wide variety of people from the community. The Core reflects the current philosophy of science education that is expressed in national documents developed by the American Association for the Advancement of Science, the National Academies of Science. This Science Core has the endorsement of the Utah Science Teachers Association. The Core reflects high standards of achievement in science for all students.

## Organization of the Elementary Science Core

The Core is designed to help teachers organize and deliver instruction.

The Science Core Curriculum's organization:

- Each grade level begins with a brief course description.
- The INTENDED LEARNING OUTCOMES (ILOs) describe the goals for science skills and attitudes. They are found at the beginning of each grade, and are an integral part of the Core that should be included as part of instruction.
- The SCIENCE BENCHMARKS describe the science content students should know. Each grade level has three to five Science Benchmarks. The ILOs and Benchmarks intersect in the Standards, Objectives and Indicators.

- A STANDARD is a broad statement of what students are expected to understand. Several Objectives are listed under each Standard.
- An OBJECTIVE is a more focused description of what students need to know and be able to do at the completion of instruction. If students have mastered the Objectives associated with a given Standard, they are judged to have mastered that Standard at that grade level. Several Indicators are described for each Objective.
- An INDICATOR is a measurable or observable student action that enables one to judge whether a student has mastered a particular Objective. Indicators are not meant to be classroom activities, but they can help guide classroom instruction.

## Guidelines

- Reflects the Nature of Science
- Coherent
- Developmentally Appropriate
- Encourages Good Teaching Practices
- Comprehensive
- Feasible
- Useful and Relevant
- Encourages Good Assessment Practices
- The Most Important Goal

# Eight Guidelines Were Used in Developing the Elementary Science Core

### Reflects the Nature of Science

Science is a way of knowing, a process of gaining knowledge and understanding of the natural world. The Core is designed to produce an integrated set of Intended Learning Outcomes (ILOs) for students. Please see the Intended Learning Outcomes document for each grade level core.

As described in these ILOs, students will:

1. Use science process and thinking skills.
2. Manifest science interests and attitudes.
3. Understand important science concepts and principles.
4. Communicate effectively using science language and reasoning.
5. Demonstrate awareness of the social and historical aspects of science.
6. Understand the nature of science.

### Coherent

The Core has been designed so that, wherever possible, the science ideas taught within a particular grade level have a logical and natural connection with each other and with those of earlier grades. Efforts have also been made to select topics and skills that integrate well with one another and with other subject areas appropriate to grade level. In addition, there is an upward articulation of science concepts, skills, and content. This spiraling is intended to prepare

students to understand and use more complex science concepts and skills as they advance through their science learning.

## Developmentally Appropriate

The Core takes into account the psychological and social readiness of students. It builds from concrete experiences to more abstract understandings. The Core describes science language students should use that is appropriate to each grade level. A more extensive vocabulary should not be emphasized. In the past, many educators may have mistakenly thought that students understood abstract concepts (such as the nature of the atom), because they repeated appropriate names and vocabulary (such as electron and neutron). The Core resists the temptation to tell about abstract concepts at inappropriate grade levels, but focuses on providing experiences with concepts that students can explore and understand in depth to build a foundation for future science learning.

## Encourages Good Teaching Practices

It is impossible to accomplish the full intent of the Core by lecturing and having students read from textbooks. The Elementary Science Core emphasizes student inquiry. Science process skills are central in each standard. Good science encourages students to gain knowledge by doing science: observing, questioning, exploring, making and testing hypotheses, comparing predictions, evaluating data, and communicating conclusions. The Core is designed to encourage instruction with students working in cooperative groups. Instruction should connect lessons with students' daily lives. The Core directs experiential science instruction for all students, not just those who have traditionally succeeded in science classes. The vignettes listed on the "Utah Science Home Page" at http://www.usoe.k12.ut.us/curr/science for each of the Core standards provide examples, based on actual practice, that demonstrate that excellent teaching of the Science Core is possible.

## Comprehensive

The Elementary Science Core does not cover all topics that have traditionally been in the elementary science curriculum; however, it does provide a comprehensive background in science. By emphasizing depth rather than breadth, the Core seeks to empower students rather than intimidate them with a collection of isolated and eminently forgettable facts. Teachers are free to add related concepts and skills, but they are expected to teach all the standards and objectives specified in the Core for their grade level.

## Feasible

Teachers and others who are familiar with Utah students, classrooms, teachers, and schools have designed the Core. It can be taught with easily obtained resources and materials. A Teacher Resource Book (TRB) is available for elementary grades and has sample lessons on each topic for each grade level. The TRB is a document that will grow as teachers add exemplary lessons aligned with the new Core. The middle grade levels have electronic textbooks available at the Utah State Office of Education's "Utah Science Home Page" at http://www.usoe.k12.ut.us/curr/science.

## Useful and Relevant

This curriculum relates directly to student needs and interests. It is grounded in the natural world in which we live. Relevance of science to other endeavors enables students to transfer skills gained from science instruction into their other school subjects and into their lives outside the classroom.

## Encourages Good Assessment Practices

Student achievement of the standards and objectives in this Core are best assessed using a variety of assessment instruments. One's purpose should be clearly in mind as assessment is planned and implemented. Performance tests are particularly appropriate to evaluate student mastery of science processes and problem-solving skills. Teachers should use a variety of classroom assessment approaches in conjunction with standard assessment instruments to inform their instruction. Sample test items, keyed to each Core Standard, may be located on the Utah Science Home Page. Observation of students engaged in science activities is highly recommended as a way to assess students' skills as well as attitudes in science. The nature of the questions posed by students provides important evidence of students' understanding of science.

## The Most Important Goal

Elementary school reaches the greatest number of students for a longer period of time during the most formative years of the school experience. Effective elementary science instruction engages students actively in enjoyable learning experiences. Science instruction should be as thrilling an experience for a child as seeing a rainbow, growing a flower, or holding a toad. Science is not just for those who have traditionally succeeded in the subject, and it is not just for those who will choose science–related careers. In a world of rapidly expanding knowledge and technology, all students must gain the skills they will need to understand and function responsibly and successfully in the world. The Core provides skills in a context that enables students to experience the joy of doing science.

# Third Grade Science Core Curriculum

In third grade students learn about interactions, relationships, relative motion, and cause and effect. They study the movement of Earth and the moon. They begin to learn of forces that move things; they learn of heat and light. Third graders observe, classify, predict, measure, and record.

Third graders should be encouraged to be curious. They should be helped and encouraged to pose their own questions about objects, events, processes, and results. Effective teachers provide students with hands-on science investigations in which student inquiry is an important goal. Teachers should provide opportunities for all students to experience many things. Third graders should use their senses as they feel the warmth of the sun on their face, watch the moon as it seems to move through broken clouds, sort and arrange their favorite rocks, look for patterns in rocks and flowers, observe a snail move ever so slowly up the side of a terrarium, test materials for slipping and sliding, measure the speed of rolling objects, and invent ways to resist gravity. They should come to enjoy science as a process of learning about the world.

- Personal relevance of science in students' lives is always an important part of helping students to value science, and should be emphasized at this grade level.

Third grade Core concepts should be integrated with concepts and skills from other curriculum areas. Reading, writing, and mathematics skills should be emphasized as integral to the instruction of science. Personal relevance of science in students' lives is always an important part of helping students to value science, and should be emphasized at this grade level.

This Core was designed using the American Association for the Advancement of Science's Project 2061: Benchmarks For Science Literacy and the National Academy of Science's National Science Education Standards as guides to determine appropriate content and skills.

The third grade Science Core has three online resources designed to help with classroom instruction; they include Teacher Resource Book – a set of lesson plans, assessment items and science information specific to third grade; Sci-ber Text – an electronic science text book specific to the Utah Core; and the science test item pool. This pool includes multiple-choice questions, performance tasks, and interpretive items aligned to the standards and objectives of the third grade curriculum. These resources are all available on the Utah Science Home Page at: http://www.usoe.k12.ut.us/curr/science

## SAFETY PRECAUTIONS:

The hands–on nature of this science curriculum increases the need for teachers to use appropriate precautions in the classroom and field. Teachers must adhere to the published guidelines for the proper use of animals, equipment, and chemicals in the classroom. These guidelines are available on the Utah Science Home Page.

# Intended Learning Outcomes for Third Grade Science

The Intended Learning Outcomes (ILOs) describe the skills and attitudes students should learn as a result of science instruction. They are an essential part of the Science Core Curriculum and provide teachers with a standard for evaluation of student learning in science. Instruction should include significant science experiences that lead to student understanding using the ILOs.

- Instruction should include significant science experiences that lead to student understanding using the ILOs.

**The main intent of science instruction in Utah is that students will value and use science as a process of obtaining knowledge based upon observable evidence.**

By the end of third grade students will be able to:

1. **Use Science Process and Thinking Skills**
   a. Observe simple objects and patterns and report their observations.
   b. Sort and sequence data according to a given criterion.
   c. Make simple predictions and inferences based upon observations.
   d. Compare things and events.
   e. Use instruments to measure length, temperature, volume, and weight using appropriate units.
   f. Conduct a simple investigation when given directions.
   g. Develop and use simple classification systems.
   h. Use observations to construct a reasonable explanation.
2. **Manifest Scientific Attitudes and Interests**
   a. Demonstrate a sense of curiosity about nature.
   b. Voluntarily read or look at books and other materials about science.
   c. Pose questions about objects, events, and processes.
3. **Understand Science Concepts and Principles**
   a. Know science information specified for their grade level.
   b. Distinguish between examples and non-examples of science concepts taught.
   c. Explain science concepts and principles using their own words and explanations.
4. **Communicate Effectively Using Science Language and Reasoning**

a. Record data accurately when given the appropriate form and format (e.g., table, graph, chart).
b. Report observation with pictures, sentences, and models.
c. Use scientific language appropriate to grade level in oral and written communication.
d. Use available reference sources to obtain information.

# Third Grade Science Standards

Science Benchmark

Earth orbits around the sun, and the moon orbits around Earth. Earth is spherical in shape and rotates on its axis to produce the night and day cycle. To people on Earth, this turning of the planet makes it appear as though the sun, moon, planets, and stars are moving across the sky once a day. However, this is only a perception as viewed from Earth.

**Standard I: Students will understand that the shape of Earth and the moon are spherical and that Earth rotates on its axis to produce the appearance of the sun and moon moving through the sky.**

*Objective 1:* Describe the appearance of Earth and the moon.

a. Describe the shape of Earth and the moon as spherical.

b. Explain that the sun is the source of light that lights the moon.

c. List the differences in the physical appearance of Earth and the moon as viewed from space.

*Objective 2:* Describe the movement of Earth and the moon and the apparent movement of other bodies through the sky.

a. Describe the motions of Earth (i.e., the rotation [spinning] of Earth on its axis, the revolution [orbit] of Earth around the sun).

b. Use a chart to show that the moon orbits Earth approximately every 28 days.

c. Use a model of Earth to demonstrate that Earth rotates on its axis once every 24 hours to produce the night and day cycle.

d. Use a model to demonstrate why it seems to a person on Earth that the sun, planets, and stars appear to move across the sky.

**Science language students should use:**

model, orbit, sphere, moon, axis, rotation, revolution, appearance

Standard I: **Students will understand that the shape of Earth and the moon are spherical and that Earth rotates on its axis to produce the appearance of the sun and moon moving through the sky.**

**Science Benchmark**

For any particular environment, some types of plants and animals survive well, some survive less well and some cannot survive at all. Organisms in an environment interact with their environment. Models can be used to investigate these interactions.

## Standard II: Students will understand that organisms depend on living and nonliving things within their environment.

**Standard II:** **Students will understand that organisms depend on living and nonliving things within their environment.**

*Objective 1:* Classify living and nonliving things in an environment.

a. Identify characteristics of living things (i.e., growth, movement, reproduction).

b. Identify characteristics of nonliving things.

c. Classify living and nonliving things in an environment.

*Objective 2:* Describe the interactions between living and nonliving things in a small environment.

a. Identify living and nonliving things in a small environment (e.g., terrarium, aquarium, flowerbed) composed of living and nonliving things.

b. Predict the effects of changes in the environment (e.g., temperature, light, moisture) on a living organism.

c. Observe and record the effect of changes (e.g., temperature, amount of water, light) upon the living organisms and nonliving things in a small–scale environment.

d. Compare a small–scale environment to a larger environment (e.g., aquarium to a pond, terrarium to a forest).

e. Pose a question about the interaction between living and nonliving things in the environment that could be investigated by observation.

**Science language students should use:**

environment, interaction, living, nonliving, organism, survive, observe, terrarium, aquarium, temperature, moisture, small–scale

**Science Benchmark**

Forces cause changes in the speed or direction of the motion of an object. The greater the force placed on an object, the greater the change in motion. The more massive an object is, the less effect a given force will have upon the motion of the object. Earth's gravity pulls objects toward it without touching them.

## Standard III: Students will understand the relationship between the force applied to an object and resulting motion of the object.

*Objective 1:* Demonstrate how forces cause changes in speed or direction of objects.

a. Show that objects at rest will not move unless a force is applied to them.

b. Compare the forces of pushing and pulling.

c. Investigate how forces applied through simple machines affect the direction and/or amount of resulting force.

*Objective 2:* Demonstrate that the greater the force applied to an object, the greater the change in speed or direction of the object.

a. Predict and observe what happens when a force is applied to an object (e.g., wind, flowing water).

b. Compare and chart the relative effects of a force of the same strength on objects of different weight (e.g., the breeze from a fan will move a piece of paper but may not move a piece of cardboard).

c. Compare the relative effects of forces of different strengths on an object (e.g., strong wind affects an object differently than a breeze).

d. Conduct a simple investigation to show what happens when objects of various weights collide with one another (e.g., marbles, balls).

e. Show how these concepts apply to various activities (e.g., batting a ball, kicking a ball, hitting a golf ball with a golf club) in terms of force, motion, speed, direction, and distance (e.g. slow, fast, hit hard, hit soft).

**Standard III: Students will understand the relationship between the force applied to an object and resulting motion of the object.**

**Standard IV: Students will understand that objects near Earth are pulled toward Earth by gravity.**

*Objective 1:* Demonstrate that gravity is a force.

a. Demonstrate that a force is required to overcome gravity.

b. Use measurement to demonstrate that heavier objects require more force than lighter ones to overcome gravity.

*Objective 2:* Describe the effects of gravity on the motion of an object.

a. Compare how the motion of an object rolling up or down a hill changes with the incline of the hill.

b. Observe, record, and compare the effect of gravity on several objects in motion (e.g., a thrown ball and a dropped ball falling to Earth).

c. Pose questions about gravity and forces.

**Science language students should use:**
distance, force, gravity, weight, motion, speed, direction, simple machine

**Standard IV:**
**Students will understand that objects near Earth are pulled toward Earth by gravity.**

**Science Benchmark**

Light is produced by the sun and observed on Earth. Living organisms use heat and light from the sun. Heat is also produced from motion when one thing rubs against another. Things that give off heat often give off light. While operating, mechanical and electrical machines produce heat and/or light.

**Standard V: Students will understand that the sun is the main source of heat and light for things living on Earth. They will also understand that the motion of rubbing objects together may produce heat.**

**Standard V:**
**Students will understand that the sun is the main source of heat and light for things living on Earth. They will also understand that the motion of rubbing objects together may produce heat.**

*Objective 1:* Provide evidence showing that the sun is the source of heat and light for Earth.

a. Compare temperatures in sunny and shady places.

b. Observe and report how sunlight affects plant growth.

c. Provide examples of how sunlight affects people and animals by providing heat and light.

d. Identify and discuss as a class some misconceptions about heat sources (e.g., clothes do not produce heat, ice cubes do not give off cold).

*Objective 2:* Demonstrate that mechanical and electrical machines produce heat and sometimes light.

a. Identify and classify mechanical and electrical sources of heat.

b. List examples of mechanical or electrical devices that produce light.

c. Predict, measure, and graph the temperature changes produced by a variety of mechanical machines and electrical devices while they are operating.

*Objective 3:* Demonstrate that heat may be produced when objects are rubbed against one another.

a. Identify several examples of how rubbing one object against another produces heat.

b. Compare relative differences in the amount of heat given off or force required to move an object over lubricated/ non–lubricated surfaces and smooth/rough surfaces (e.g., waterslide with and without water, hands rubbing together with and without lotion).

**Science language students should use:**

mechanical, electrical, temperature, degrees, lubricated, misconception, heat source, machine

# Facilitated

## Activities

Day 2 – Invitation to Learn

# What Is Differentiation?

"…a purposeful process for adapting the teaching and learning processes of the classroom to accommodate the needs of all learners…it is an especially useful tool for insuring that all students have access to and are appropriately supported in their acquisition of important mathematical knowledge."

Carol Ann Tomlinson

Day 3 – Faclitated Activity

# Choosing an Approach

"Students should consolidate and practice a small number of computational algorithms for addition, subtraction, multiplication and division that they understand well and can use routinely… Having access to more than one method for each operation allows students to choose an approach that best fits the numbers in a particular problem."

NCTM

# Differentiation Self Assessment

These nine attitudes and skills typify teachers who help all learners. Read each statement and assess yourself.

1. I establish clarity about curricular essentials.

   (I know what is important for my students to know about the subjects I teach.)

   Always Often Sometimes Never

2. I accept responsibility for learner success.

   (If a student has not learned a thing of importance, the teacher has not taught well enough.)

   Always Often Sometimes Never

3. I develop communities of respect.

   (Teacher and students accept and understand commonalities and differences.)

   Always Often Sometimes Never

4. I build a personal awareness of what works for each student.

   Always Often Sometimes Never

5. I develop classroom management routines that contribute to success.

   Always Often Sometimes Never

6. I help students become effective partners in their own success.

   Always Often Sometimes Never

7. I develop flexible classroom routines.

   (Think about instructional pacing, furniture arrangement and grouping options, supplementary materials at various levels, etc.)

   Always Often Sometimes Never

8. I expand my repertoire of instructional strategies.

   Always Often Sometimes Never

9. I reflect on individual student progress with an eye toward curricular goals and personal student growth.

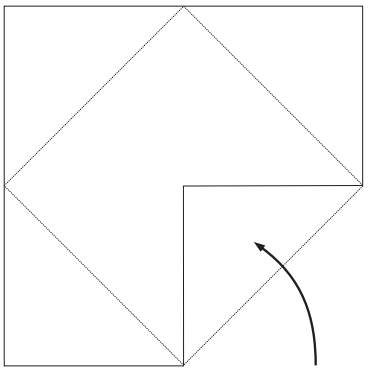
   (Consider how you use assessment to plan for instruction, tracking and reporting student growth.

   Always Often Sometimes Never

# My Capacity Flip Book

Name _____

4 1/2 inch square for center gallon piece inside • 3 squares measuring 6 3/4 • Fold outside corners to center to make another square. Place each square inside each other. Place the 4 1/2 inch square inside the inner most square.



_____ cut

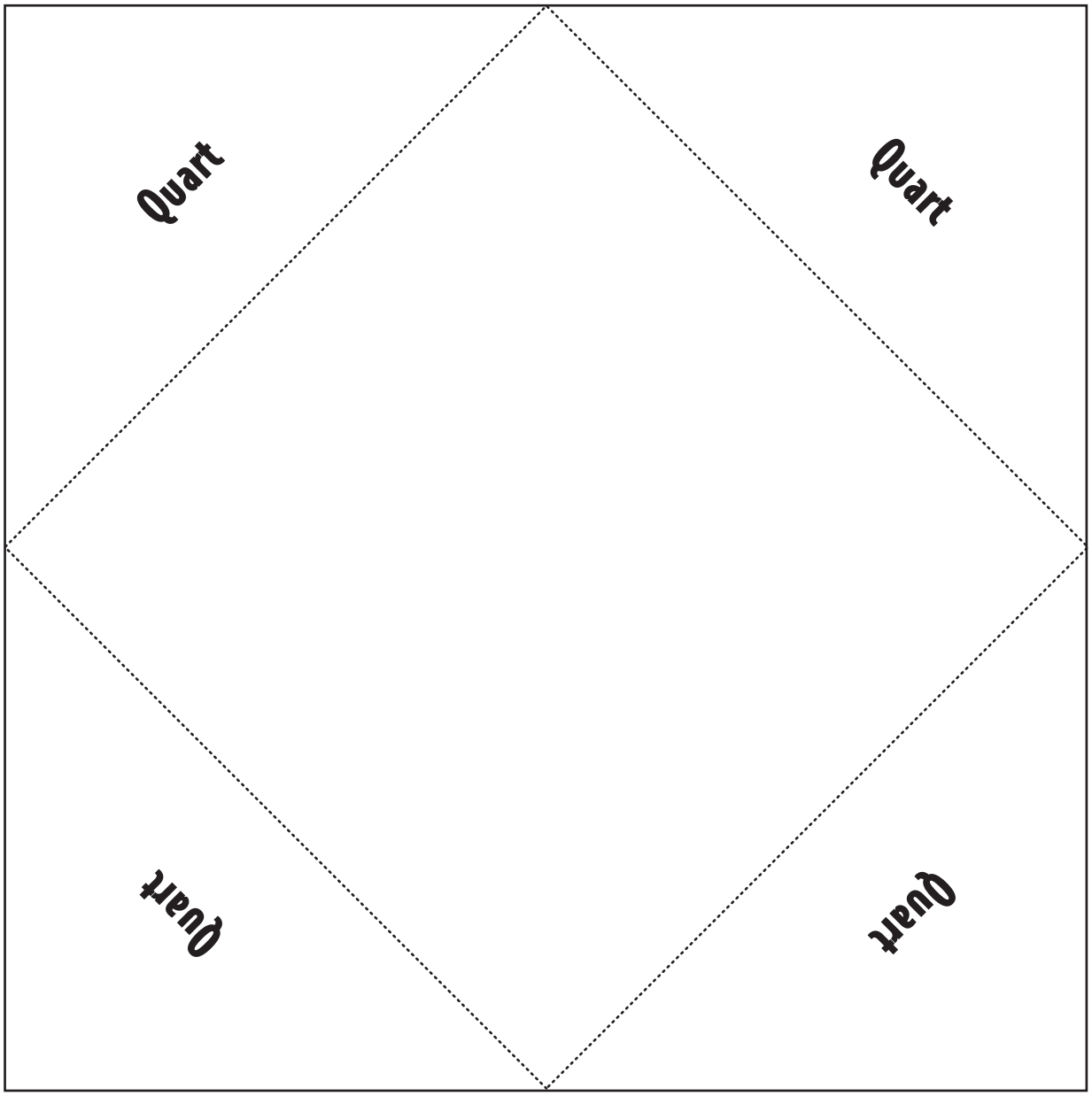
..... fold

**Gallon**

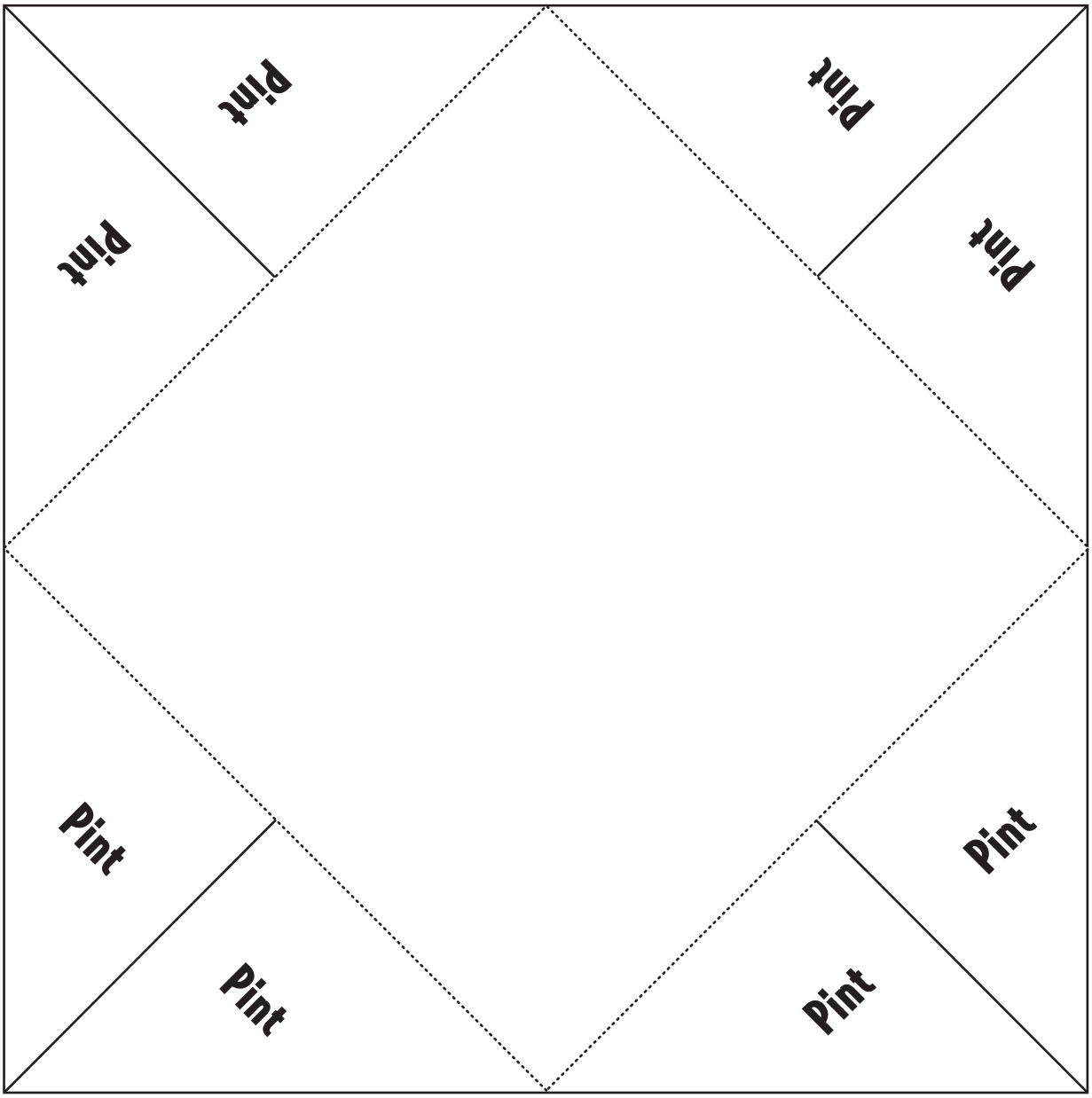
**Gallon**

for 2 separate books

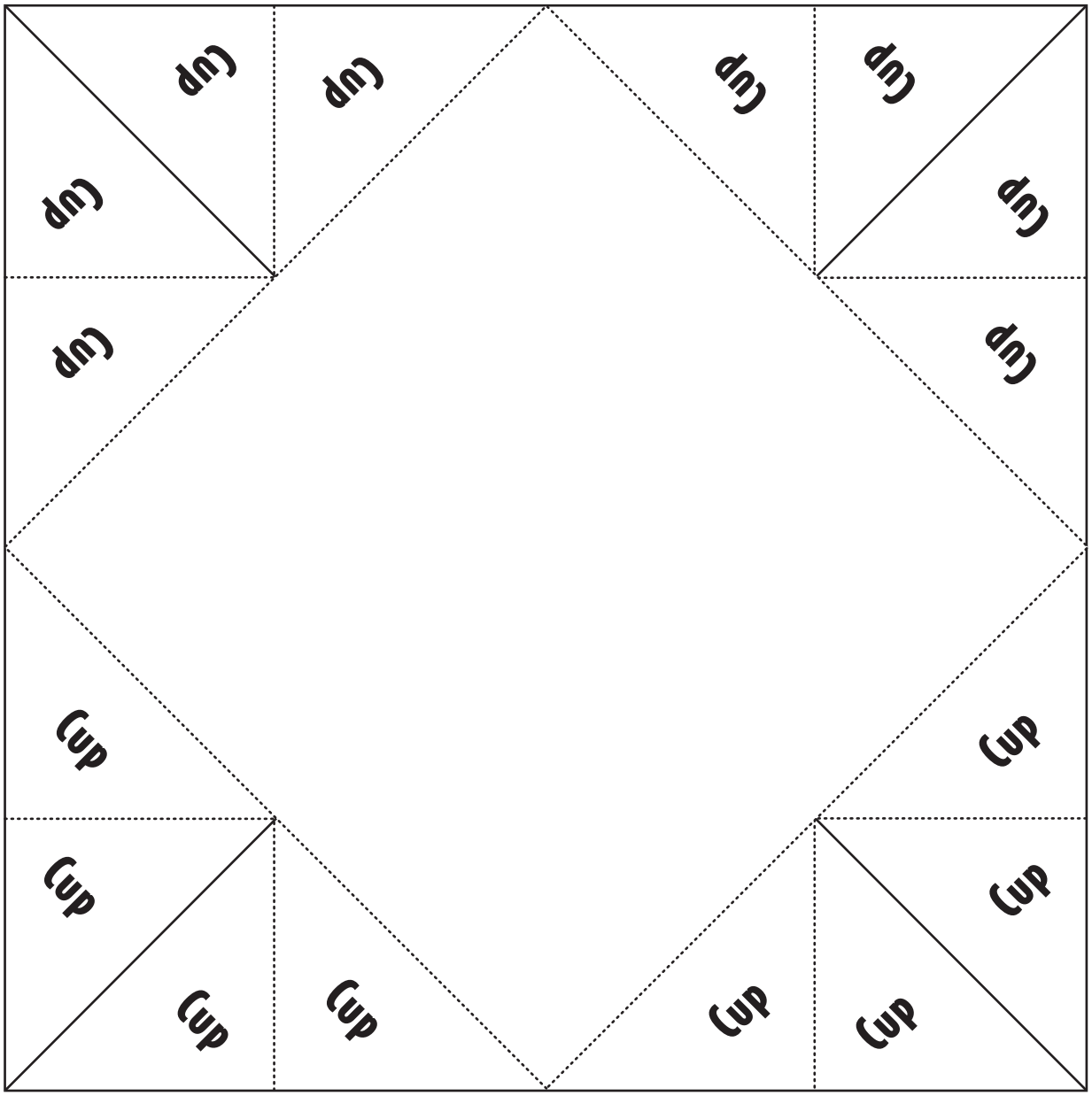
# Quart



# Pint

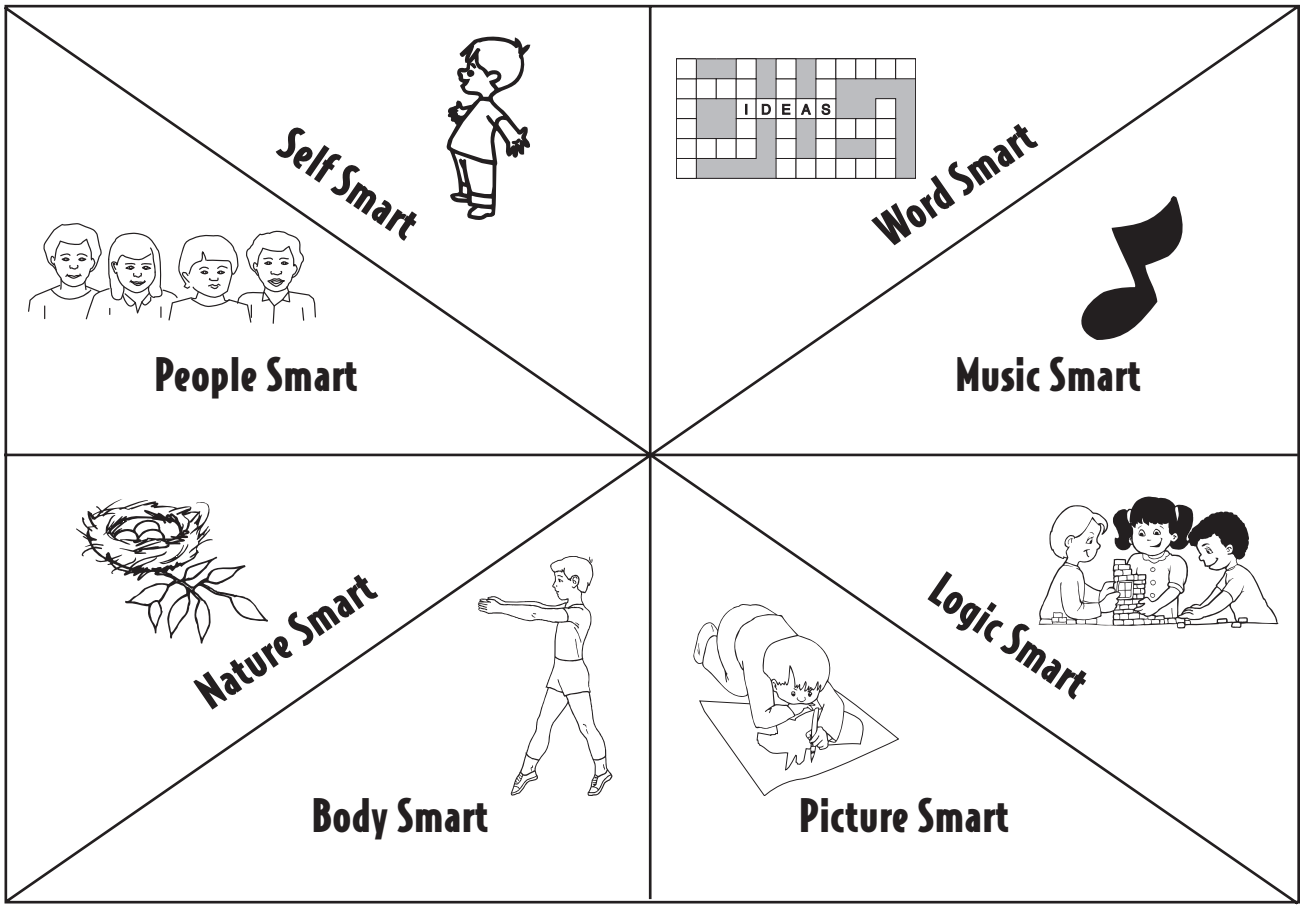


# Cup



# How do you Learn

| Self Smart | Word Smart | Music Smart | Logic Smart |
|---|---|---|---|
| I am aware of my own feelings. I can control my anger by giving "I" messages. I can listen to directions and work on my own. | I understand word rules and I can read. I can spell by spelling out the words. | I love to sing. I can play an instrument. I can clap on beat. | I am good at math. I like hands-on activities and science. I like puzzles and I like to figure things out. |
| **Picture Smart** | **Body Smart** | **Nature Smart** | **People Smart** |
| I am good at drawing and coloring. I can picture in my head what I want to draw. | I am coordinated in P.E. and sports. I enjoy physical games. | I enjoy nature by observing and listening to sounds around me. | I get along with others. I love to talk and have lots of friends. I think of others first. |

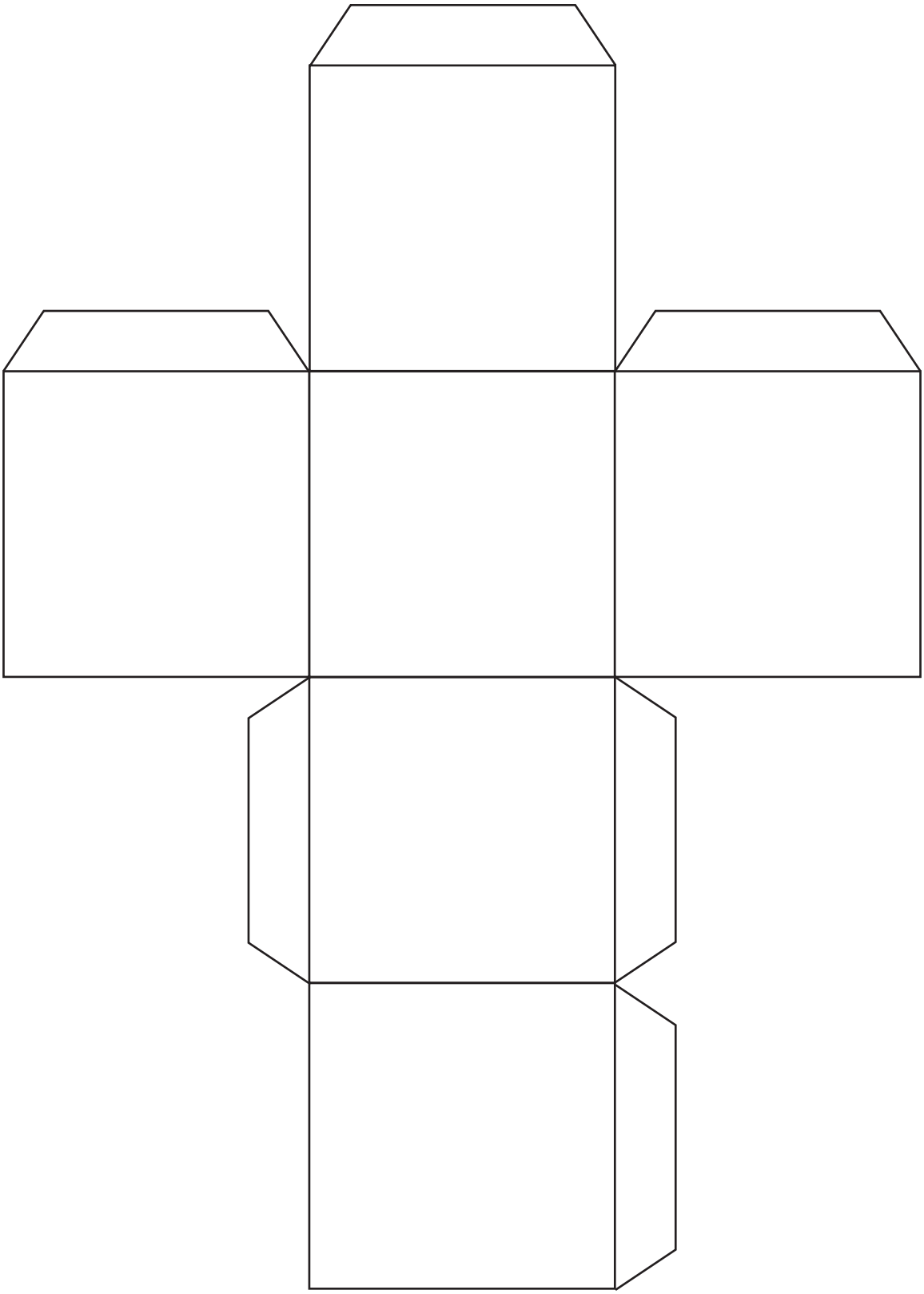


# How Do You Learn: Concept Cards

| | | | |
|---|---|---|---|
| **Isosceles triangle** | **Equilateral triangle** | **Right angle** | **Parallelogram** |
| **Rectangle** | **Square** | **Greater than a right angle** | **Less than a right angle** |
| **Pentagon** | **Hexagon** | **Octagons** | **Push** |
| **Pull** | **Airplane** | **Gravity** | **Earth** |

| | | | |
|---|---|---|---|
| **Heat** | **Light** | **Sun** | **Living Things** |
| **Time** | **Ruler** | **Foot** | **Expanded form** |
| **Place value** | **Number line** | **Parallel** | **Thermometer** |

# Cube



# Tiered Activities

Using tiered lessons is a way for teachers to ensure that all students, regardless of ability level or learning style, progress towards mastery of learning goals and objectives. Tiered assignments, also known as scaffolding, allow for differing levels of readiness and performance levels. The entire class works toward the same essential understanding (parallel tasks) but their paths to that goal depend upon their abilities and learning styles (varied levels of depth and varied degrees of support).

The following are guidelines for planning tiered lessons/assessments. Teachers should:

1. Using the Core Curriculum, pick a concept or skill that needs to be learned (e.g. "What's the ultimate measurable objective?").
2. Think of an activity that matches the objective.
3. Use pre-assessment data to determine the individual needs of the students. Consider students performing above grade level, students below grade level, English Language Learners, and students with varying learning style preferences (multiple intelligences).
4. Take another look at the selected activity. Target its complexity to be appropriate for on-grade-level learners.
5. Modify the activity or assessment to meet the needs of the other learners in the class. Within one activity, there will be several tiers to meet the wide range of student needs.
6. Seek consultation from the specialists in the school, as well as fellow colleagues.
7. Teach the activity, including the various tiers.
8. Reflect and refine.

Remember, tiered lessons provide differentiation because of varied levels of complexity, not necessarily because of varied quantities of work. Here are a few considerations for educators, as they implement use of tiered activities to scaffold for student learning:

- Just because students are above grade level, that does not mean they should be given more work.
- Just because students are below grade level, that does not mean they should be given less work.
- All tiered activities should be interesting and appealing.
- All tasks should provide a challenge.

Tomlinson, C.A. (1999). *The Differentiated Classroom*. (p. 83). Alexandria, VA: ASCD.

Conklin, W. (2007). *Applying Differentiation Strategies*. (pp. 149-202). Huntington Beach, CA: Shell Education.

McCombs, B.L. (1995). Understanding the keys to motivation to learn. *Noteworthy Perspectives: What's Noteworthy on Learners, Learning, and Schooling.*

# Math III-1 & 2

## Activities

## Geometry

# Mr. Bo Jangle, What's Your Angle?

**Standard III:**

Students will describe and analyze attributes of two-dimensional shapes.

**Objective 1:**

Describe and compare attributes of two-dimensional shapes.

**Intended Learning Outcomes:**

4. Communicate mathematical ideas and arguments coherently to peers, teachers, and others using the precise language and notation of mathematics.
5. Connect mathematical ideas within mathematics, to other disciplines, and to everyday experiences.

**Content Connections:**

Math IV-1; Elapsed Time
Science II-1; Living and Nonliving Things

*Math Standard III*

*Objective 1*

Connections

## Background Information

Students need to have been previously taught that an angle consists of two rays sharing the same endpoint. Angles look different depending on their size. Right angles are most commonly referred to as a square corner because of the 90° angle they make. Angles smaller than a right angle, are referred to as acute and will fit inside any right angle because they measure less than 90°. Angles greater than a right angle are named obtuse. They are bigger than 90°. These angles make up shapes found in the world around us.

## Research Basis

Milson, J. (1979). "Geometry and the Real World." *School Science and Mathematics*. 79(8) 695-700.

Students often feel geometry is useless because it is presented abstractly not relating to their own world. Only when teachers apply geometry to other areas do students begin to appreciate it. When students are shown the practical side of geometry as applied to science and geometric forms found around them, they feel this mathematic area is worth learning.

Browning, C. A., Garza-Kling, G., & Sundling, E. H. (2007). "What's Your Angle on Angles?" *Teaching Children Mathematics*. 14(5) 283-287.

Students need to be given the opportunity to explore the definition of an angle. As students are exposed to angles using different mediums, they will begin to grasp what an angle actually is. Their angle definitions need to be challenged and expanded upon continually. Students need to share their discoveries with others.

**Materials**

- ❑ Chenille stems

## Invitation to Learn

Students will play the role of a clock. Their arms will create times found throughout the day. First students will make 9:30 using their arms. This time represents a right angle. Next students will elapse time to 10:15. This will represent an angle that is greater than the right angle. Finally students will once again elapse time to make 11:05. This angle is less than a right angle. After students have made all three angles with their arms they will recreate them using 3-6 inch chenille stems. These angles will be taped into their math journals. Students will label each angle.

**Materials**

- ❑ *Shapes, Shapes, Shapes*
- ❑ Crayons
- ❑ *Growing Tree*
- ❑ *I Spy an Angle*
- ❑ Scissors
- ❑ Glue

## Instructional Procedures

1. Students will look at the book *Shapes, Shapes, Shapes* to identify angles found in the real world. With the help of the teacher and an angle tool they will classify each angle they find as right, greater, or less than a right angle.
2. Students will cut out the *Growing Tree* and paste it into their math journals.
3. Using red, blue, and green crayons students will classify each angle the tree limbs make.
   - Red – Right Angles, Blue – Greater Than Right, Green – Less Than Right
4. Students will create a book where they will record angles found within their environment. Students need to cut out the two boxes found on the *I Spy an Angle* page. The top box is the title and should be glued to the front of their books. The bottom box is a reference guide for students. It needs to be glued to the back of the title page.
5. Using a local newspaper, have students search for items that contain angles. Once they find some, they need to cut them out and glue them into their books. After each one is glued, students need to indicate what type of angle it contains.
6. Students need to take their angle books and a pencil outside to the playground. They need to observe their environment and draw objects that contain angles in their books. When the students get back into the classroom they need to classify each angle that they drew.
7. Have students share with the class the items that they drew in their *I Spy an Angle* books. Allow them to explain the process they went through to classify each one of their angles.

## Assessment Suggestions

- Bring into the classroom several real world items that contain angles. Have students classify each angle that is found in these items.

## Curriculum Extensions/Adaptations/ Integration

- Take pictures of the environment that your students live in. Enlarge the pictures to 5x7 or 8x10. Compile these pictures into a book for your students to look at. Have your students go through these pictures searching for angles. As they find some, students can work with a partner to classify them.
- Find a local map of your area and enlarge it. Have your higher students search for roads that intersect. These students can determine what type of angle these intersecting roads create.
- Using a Zoome Tool Kit students need to create objects made up of all angle types. After they are finished have students classify several angles found within the creation.

## Family Connections

- Have students take their *I Spy An Angle* books home. They need to draw three different items seen around their home environment. Each item must contain a different type of angle.

## Additional Resources

### Books

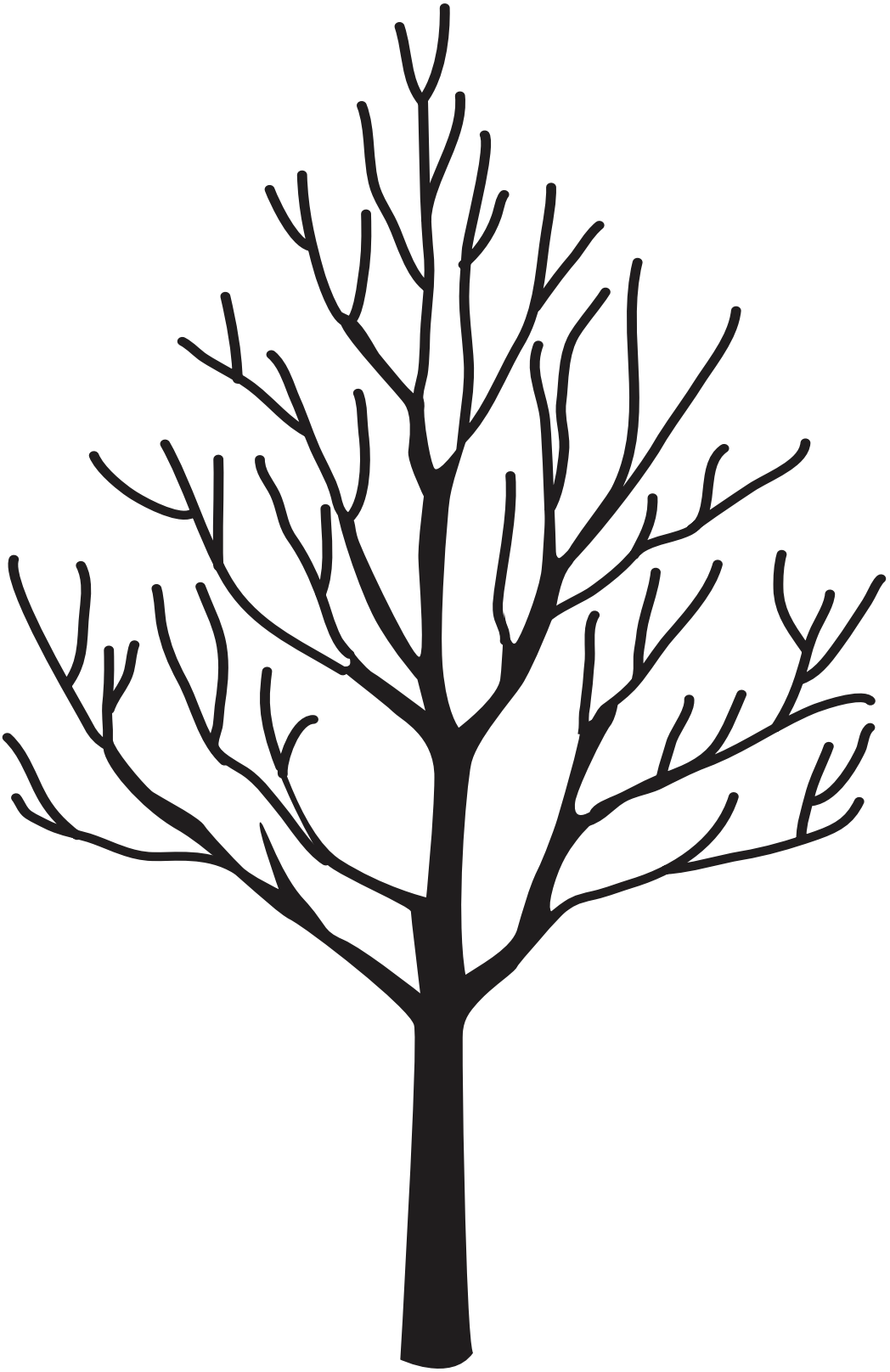
*Shapes, Shapes, Shapes*, by Tana Hoban; ISBN 0-688-14740-2

*Sir Cumference and the Great Knight of Angleland*, by Cindy Neuschwander; ISBN 1-57091-169-X

### Web sites

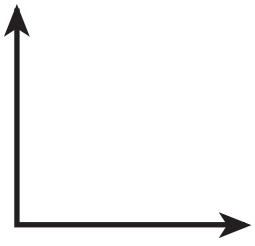
http://nlvm.usu.edu/en/nav/grade_g_2.html (national library of virtual manipulative)

# Growing Tree

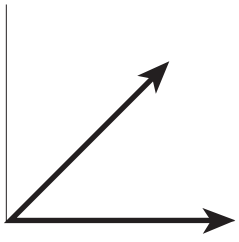


# I Spy an Angle

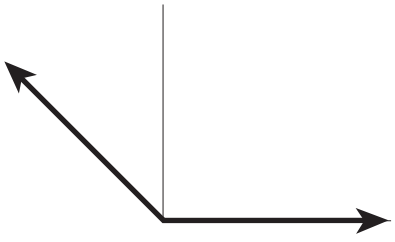
# Reference Guide



**Right Angle**



**Less Than a Right Angle**



**Greater Than a Right Angle**

# Try This Triangle Out For Size

*Math Standard III*

*Objective 3*

Connections

**Standard III:**

Students will describe and analyze attributes of two-dimensional shapes.

**Objective 3:**

Describe and compare attributes of two-dimensional shapes.

**Intended Learning Outcomes:**

4. Communicate mathematical ideas and arguments coherently to peers, teachers, and others using the precise language and notation of mathematics.
5. Connect mathematical ideas within mathematics, to other disciplines, and to everyday experiences.

**Content Connections:**

Language Arts VIII-2; Writing to communicate effectively
Math V-1; Collect, organize, and display data

## Background Information

Students need to understand that polygons are closed plane figures made up of line segments. The attributes of polygons vary according to the number of sides and types of angles they contain. Students need to learn that prefixes indicate the number of sides of a polygons. Those prefixes include the following: tri – three, quad – four, pent – five, hex – six, and oct – eight.

## Research Basis

Boaler, J. (1998). "Open and Closed Mathematics: Student Experiences and Understandings." *Journal For Research in Mathematics Education*. 29(1) 41-62.

It is difficult for students to transfer classroom-learned math to situations in the real world. Teachers could help students overcome this by using different teaching methods to conquer math concepts. Math will become more exciting for students as they are given practical and investigative assignments. Students are challenged as they learn how to use their math knowledge in real world experiences.

Moyer, P. S. (2001). "Are We Having Fun Yet? How Teachers Use Manipulatives To Teach Mathematics." *Educational Studies in Mathematics*. 47(2) 175-197.

It has been proven that math manipulatives benefit students. Manipulatives need to be consistently and effectively used in the classroom. They show representations of abstract math concepts to our students. With the help of manipulatives, teachers also can make connections between a student's newly acquired math knowledge to those concepts once learned. It is up to the teacher to consistently learn new ways to implement the manipulatives into daily math instruction.

# Invitation to Learn

Students need to make a right, equilateral, and isosceles triangle by using three pieces of chenille stems. Once the shapes are made, they will be used as bubble wands. Predict which triangle will make bigger bubbles. Place each wand into a soapy bubble solution and blow bubbles out. Discuss which triangle worked out better for students.

**Materials**

- ❑ Chenille stems
- ❑ Bubbles

# Instructional Procedures

## Which Triangle Is It?

**Materials**

- ❑ Drinking Straws
- ❑ Scissors
- ❑ Ruler
- ❑ Paper Clips
- ❑ *Which Triangle Is It?*

1. Cut the 9 plastic straws into the following segments: 1 straw – 4 inches, 5 straws – 6 inches, 2 straws – 7 inches, and keep one at full length.
2. All of the paper clips (9) need to be opened up.
3. To make a right triangle, insert one bent end of each paper clip into the following straw segments: 2 – 7 inch straws and the full length straw.
4. To make an equilateral triangle, insert one bent end of each paper clip into the following straw segments: 3 – 6 inch straws.
5. To make an isosceles triangle, insert one bent end of each paper clip into the following straw segments: 2 – 6 inch straws and 1 – 4 inch straw.
6. Students then will trace each triangle into their math journals. They need to indicate the length of each side and type of angles it has. Finally, students need to write the name of the triangle below the tracing. These triangles need to be placed in a pocket that students have created inside of their math journals.
7. Students will use the information now recorded in their math journals to create a bar graph found on *Which Triangle Is It?* They will indicate how many sides, equal sides, and types of angles each triangle has. Use the color code for each bar found on this worksheet.

## Dribble, Shoot, Score

**Materials**

- ❑ *Dribble, Shoot, and Score*
- ❑ Basketball and Hoop
- ❑ Measuring tape
- ❑ Yarn
- ❑ Glue
- ❑ Scissors

1. Place several miniature basketball hoops around the classroom.
2. Divide students into groups and assign them an area around one of the miniature basketball hoops.

3. The basketball hoop will serve as one point of the triangle. Two other students will represent the other two points of a triangle. Groups will use a measuring tape to place these students at the appropriate places to create a right, equilateral, and isosceles triangle.
4. After each triangle is created, students will connect yarn between the basketball hoop and the two people. This will help them visualize what these triangles look like.
5. Students will cut out the basketball hoops found on *Dribble, Shoot, and Score* page.
6. Using the basketball hoop as a triangle point, students will create their own right, equilateral, and isosceles triangles in their math journals.

**Materials**

- ❑ *Trianglo*
- ❑ Bingo chips

### Trianglo

1. Students are given a *Trianglo* card and 25 bingo chips.
2. Teachers will show students a picture of a real world item that contains some type of triangle in it. These triangles can either be classified as right, isosceles, or equilateral.
3. Students will determine which triangle it is and then place a bingo chip on a square that contains that triangle's name.
4. The student that has bingo chips placed in five squares straight across, down, or diagonally calls out trianglo.

## Assessment Suggestions

- Give students a sheet of drawn triangles. Have students cut these shapes out. Once students cut the shapes have them classify each triangle as either being right, isosceles, or equilateral.
- Using a Zoome Tool Kit students need to create objects made up of all triangles. Once their object is finished they must classify the triangles found within it.

## Curriculum Extensions/Adaptations/ Integration

- Buy a disposable camera for the class. Instruct students that they will receive the camera for one night. On the night that it is their turn students will take the camera home and photograph a picture of a triangle in the real world. After each

student has had a turn then get the film developed. Using the pictures they took, students will create a classroom book about classifying triangles.

## Family Connections

- Have students write an article on how to make a sandwich. Students need to include how to cut the sandwich into one of the triangles they have learned about. After they write the article have students go home and actually do it. Students' parents must report back to the teacher on how it went.

## Additional Resources

### Books

*Triangles*, by Esther Sarfatti; ISBN 978-1-60044-669-6

*A Triangle For Adaora*, by Ifeoma Onyefulu; ISBN 978-1-84507-738-9

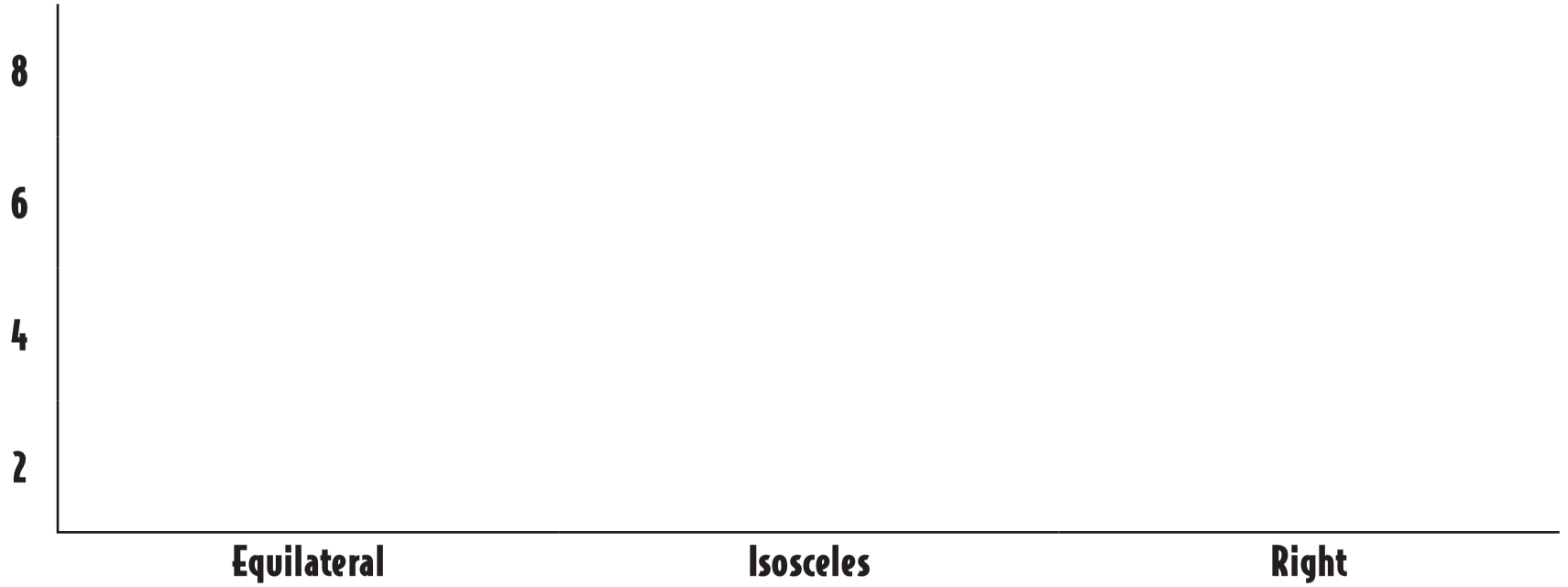
*Triangles, Seeing Triangles All Around Us*, by Sarah L. Schuette; ISBN 0-7368-5063-5

*Triangles around Town*, by Nathan Olson; ISBN 978-0-7368-6373-5

### Web sites

http://www.teach-nology.com/web_tools/materials/bingo/5/

# Which Triangle Is It?




| | |
|---|---|
| Red | Number of Sides |
| Blue | Number of Equal Sides |
| Green | Number of Right Angles |
| Yellow | Number of Greater Than Right Angles |
| Purple | Number of Less Than Right Angles |

# Dribble, Shoot, and Score






# Trianglo

| | | | | |
|---|---|---|---|---|
| Isosceles | Equilateral | Isosceles | Right | Equilateral |
| Right | Isosceles | Right | Equilateral | Isosceles |
| Equilateral | Isosceles | FREE SPACE | Right | Equilateral |
| Isosceles | Right | Equilateral | Equilateral | Right |
| Right | Isosceles | Isosceles | Isosceles | Equilateral |

| | | | | |
|---|---|---|---|---|
| Equilateral | Right | Isosceles | Equilateral | Equilateral |
| FREE SPACE | Right | Right | Right | Isosceles |
| Isosceles | Right | Isosceles | Isosceles | Equilateral |
| Equilateral | Right | Equilateral | Isosceles | Isosceles |
| Equilateral | Right | Isosceles | Isosceles | Right |

# Trianglo

| | | | | |
|---|---|---|---|---|
| Equilateral | Isosceles | Equilateral | FREE SPACE | Equilateral |
| Isosceles | Right | Equilateral | Equilateral | Isosceles |
| Right | Right | Isosceles | Isosceles | Right |
| Right | Equilateral | Equilateral | Right | Right |
| Isosceles | Equilateral | Right | Isosceles | Equilateral |

| | | | | |
|---|---|---|---|---|
| Equilateral | Right | Right | Equilateral | Isosceles |
| Isosceles | Equilateral | FREE SPACE | Equilateral | Equilateral |
| Right | Isosceles | Isosceles | Right | Equilateral |
| Equilateral | Isosceles | Isosceles | Equilateral | Right |
| Right | Right | Equilateral | Isosceles | Right |

# Science III

## Activities

## Force Motion

# The Larger It Is the Harder It Falls

*Science Standard III*

*Objective 1*

**Standard III:**

Students will understand the relationship between the force applied to an object and resulting motion of the object.

**Objective 1:**

Demonstrate that gravity is a force.

**Intended Learning Outcomes:**

1. Use Science Process and Thinking Skills
3. Understand Science Concepts and Principles

**Content Connections:**

Physical Fitness I; Health enhancing levels of fitness

Connections

## Background Information

These activities can be done outside, in the gym or in the classroom – just move the desks. Children will be using large muscle groups to find out about gravity's power/force!

## Research Basis

Linksman M.Ed., Ricki, National Reading Diagnostics Institute, 2007. The Fine Line between ADHD and Kinesthetic Learners. Association for Comprehensive Neuro Therapy

This was a comparison and contrast between children who have been diagnosed with ADHD and children who require large muscle involvement in their learning. Because of the required movement they may well be kinesthetic learners not ADHD children. However, our classrooms are usually geared to the children who learn via their hearing (auditory) and eyesight (visual). It is sometimes very difficult to incorporate the kinesthetic learner into the classroom, hence, the following activities.

## Invitation to Learn

Drop a stone (this stone should weigh about 15 pounds), plastic ball, rubber ball and a large paper clip into a container of sand (the container is about 24x16x8 with 3 inches of play sand in the bottom). Examine the craters. Ask "why are some of the craters larger and deeper than others?" "What made the objects fall toward Earth?" "What would happen if we didn't have gravity?"

Then have the children partner measure from the floor to their partner's knees (the average is approximately 17 inches). Show this on

### Materials

- ❏ Pocket Folder
- ❏ 3x5 cards
- ❏ Pencil, pens, markers
- ❏ Heavy paper
- ❏ Straight-edge
- ❏ Ruler
- ❏ Paper clips
- ❏ Paper punch
- ❏ Raffia, string or ribbon
- ❏ *Physical Science for Children*

a yard stick – "it doesn't seem to be very far." "If it isn't very far then why does it hurt so much when you fall down?"

# Instructional Procedures

## Science Pocket Folder

1. Read *If*; by Sarah Perry.
2. Using the heavy paper, take the paper clip and straight-edge and use them to score a line 2 inches up from each of the longer sides, all the way across the paper. Scoring makes folding easier.
3. Fold both the edges toward the center of the paper and crease.
4. On this same side, using the ruler (it is smaller) and paper clip score a line every 4 inches. The score lines start at the top fold and run all the way through to the second fold.
5. Fold the paper, accordion style and crease.
6. Punch a small hole (hole punch) in the middle of each of the vertical edges about ¾ inch in and half way down the vertical edge; this will be used to thread and hold the book together.
7. The 3x5 cards are used to list the vocabulary definitions:

| | |
|---|---|
| Science language | distance, force, gravity, weight, motion, speed, direction, simple machine |

8. Each definition belongs in one of the pockets of the Science Pocket Folder with room for the activity items seen later on.
9. When the child does an experiment, at school or at home, they can describe, in pictures or words, how this experiment worked and place it behind the definition that they believe their experiment describes.
10. The Science Pocket Folder has enough pockets that the tools and instructions used in these experiments can be kept in the pocket folder as well.
11. The folder, cards with definitions, participation, drawings and explanations are the final assessment. They are a fine item to take home to parent(s) as well, and with the simple implements intact, the children will be able to demonstrate the experiments at home.

### Gravity Specific Exercise

1. Leg lifts; Have the children lay flat, cross their arms across their chest (these cannot move) and raise their legs to a 45 degree angle. This is not difficult, as the leg is in line with the hip and rests or *balances* (forces are equal) there. Now have them try a 30 degree angle. It can't be held for long because of gravity.
2. Balance; Have the children sit on the floor/ground and again cross their hands across their chest (these cannot move). Next, have them bend their knees and lift their feet off the floor. They are trying to find a balance point on their pockets where they can resist gravity and remain stable. Use a timer to see how long people can remain balanced. Chart it!
3. Human dominos; Children sit next to each other in one long line; again the arms are across the chest (they cannot move). Their shoulders should be touching their partner's shoulders. Their knees are bent. Have the children raise their feet off the ground and have one person tip to the right or left. Everyone will fall like a group of dominos!
4. Ant crawl; for two minutes have the girls then the boys ant crawl. Their stomachs are towards the ceiling and they are using their arms and legs to crawl around the area like an ant. No one can do this for 2 minutes because gravity is pulling them down. The only ones to make it were the ones who held still and placed themselves in balance with the gravitational pull of Earth.

## Assessment Suggestions

- This is where the 3x5 cards come into play. Give the children 4 cards (extras should be available, if necessary) and have them draw or describe what happened in each of the above activities. Then they place their cards behind the definition card in the pocket folder. If the explanations are accurate; points are awarded.

## Curriculum Extensions/Adaptations/ Integration

- Tug of war; demonstrates balance of force and the force of pulling. During the game, incline planes become obvious when children brace themselves. Include ideas for integration for other curricular areas (use appropriate subject area headings).

# Family Connections

- The Science Pocket Folder will contain multiple options for experimentation at home.

# Additional Resources

## Media

*All About Forces & Gravity*, The Schlessinger Science Library; Physical Science for Children; introduces all the vocabulary and has many demonstrations that cannot be duplicated in the classroom. About 23 minutes long.

## Articles

*Do you know Your Child's Learning Style?* Education Articles/Differentiated Learning, By Jane Saeman, March 4,

## Web sites

http://www.edarticle.com

www.frsd.k12.nj.us/rfmslibrarylab/di/differentiated_instruction.htm

# Super Paper Planes

**Standard III:**

Students will understand the relationship between the force applied to an object and the resulting motion of the object.

**Objective 2:**

Demonstrate that the greater the force applied to an object, the greater the change in speed or direction of the object.

**Intended Learning Outcomes:**

2. Manifest Scientific Attitudes and Interests.
3. Understand Science Concepts and Principles.

**Content Connections:**

Math V; Collect and organize date to make predictions

*Science Standard I*

*Objective 3*

Connections

## Background Information

The force used is air from the lungs. Therefore, the more air forced from the lungs the farther and faster something will go. What happens then, if you have three similar objects, the same design but of different *mass*?

## Research Basis

Tomson, K. E. *Show and Tell: Journal Writing Every Day: Teachers Say It Really Works!* Education World. Professional Development, Curriculum.

An overview of journal writing in the classroom and the benefits derived from daily writing. The teachers who spoke ranged from high school to first grade. All believed that it improved writing skill; grammar, spelling, structure and communication abilities. The surprises were the enhancement of the teacher/student relationships and the willingness to write about all subjects, including math. Some stated that it was a slow daily process, but the rewards were more than worth the effort.

## Invitation to Learn

This is a force, mass and measurement activity. Children work in pairs; one participates while the other measures. Children will create 3 planes, powered by a straw, out of 3 different kinds of paper. Find a place to set up. A long hallway is fine. Using masking tape set up a starting area by making a "toe" line. This is the spot where all participants will start. Then measure off 3 feet (1 yard), 6 feet (2 yards) and 9 feet (3 yards) and make tape lines with the measurements noted.

## Materials

- ❑ *Super Paper Planes*
- ❑ Straw
- ❑ Paper squares
- ❑ Clear tape
- ❑ Large paper clips
- ❑ Paper tube
- ❑ Pencil
- ❑ Index cards

## Instructional Procedures

1. Create the planes by using the paperclip to trace over the top of the pattern, press hard so the indentation can be seen and used. This makes it easier to fold.
2. Follow the instructions, make all three paper planes (the planes made out of the heavier paper will take a little more time.
3. Make a paper tube out of the lightest paper. It should be approximately 6 to 8 inches long; 2 inches for each plane.
4. Close one end of each tube by folding the paper back on itself and taping the folded edge.
5. The tube should be as air tight as possible.
6. The tube can be attached, with tape, to each plane, on the top or the bottom. It is the child's choice.
7. The children take turns standing at the "toe" line, inserting the straw into the paper tubes and using "lung" capacity to push the planes down the hallway.
8. Their partner records the results. The results can be graphed.
9. The children record the results of the plane activity on the three index cards; using mass or the weight of the plane as the writing criteria.

## Assessment Suggestions

- Following directions; are the children able to successfully make the planes? Are they able to cooperate and participate with one another?
- 3 x 5 index card proper placement in the Science Pocket Folder
- Index card explanation

## Curriculum Extensions/Adaptations/ Integration

- Try differently designed planes; larger – smaller.
- This activity requires some degree of small muscle coordination. Children with this complication may require some assistance from the teacher or their partner.

# Family Connections

- Supply a copy of the Super Paper Planes template and instruction.
- Children can take this home and remake the planes out of multiple items.

# Additional Resources

## Books

*The Great International Paper Airplane Book,* by Jerry Mander, George Dippel and Howard Gossage; a Fireside Book Published By Simon and Schuster; New York

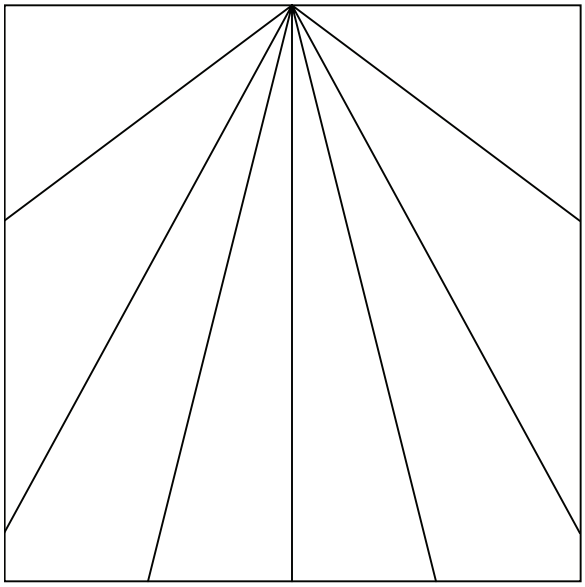
## Web sites

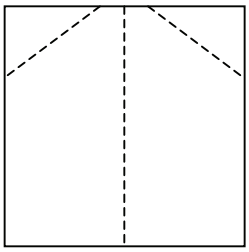
Flight Simulator - http://www.workman.com/etcetera/games/fliersclub/

http://www.zurqui.com/crinfocus/paper/airplane.html

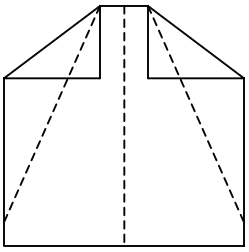
http://teacher.scholastic.com/writewit/diary/

# Super Paper Planes

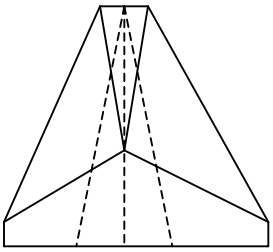




1. Crease on the center line and fold the corners inward.

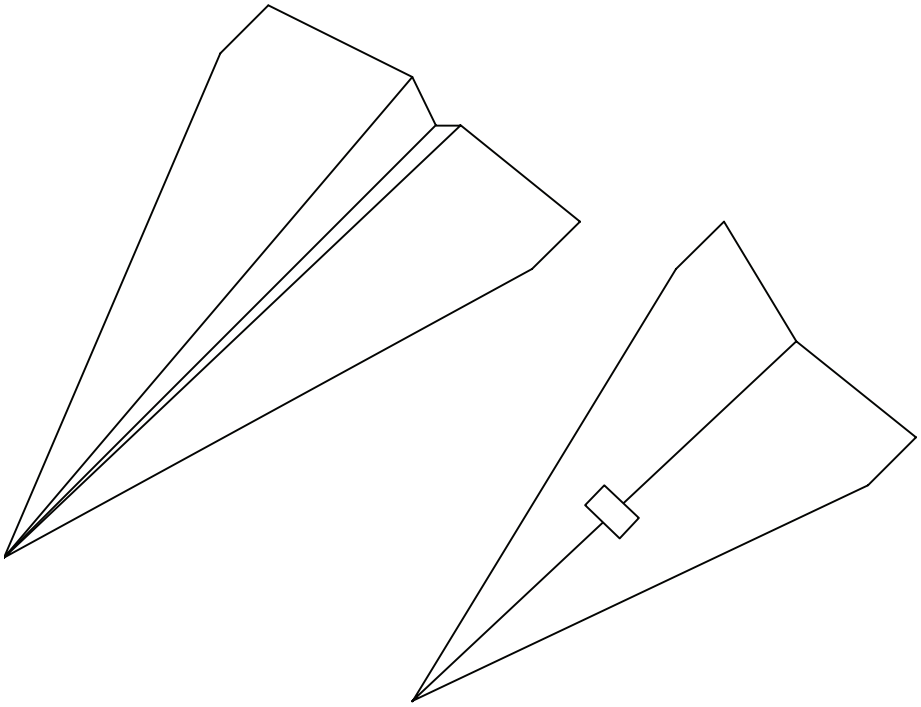


2. Fold again on dotted line.



3. Fold away from you on center line. Make opposite folds on dotted lines.

4. To get this.



5. Hold wings together with tape giving them a slight upward angle.

The paper tube can be attached, with tape to the top or bottom of the plane.

# Catapult Creations

**Standard III:**

Students will understand the relationship between the force applied to an object and resulting motion of the object.

**Objective 1:**

Demonstrate how forces cause changes in speed or direction of objects.

**Intended Learning Outcomes:**

2. Manifest Scientific Attitudes and Interests.
4. Communicate Effectively Using Science Language and Reasoning.

**Content Connections:**

Math V; Collect and organize date to make predictions

*Science Standard III*

*Objective 1*

Connections

## Background Information

Using a variety of easily found tools children will have an opportunity to observe, participate in creating and use catapults and levers. The children should understand the ideas of balance, force, motion, push and pull.

## Research Basis

U.S. Department of Education. Office of Communications and Outreach. *Helping Your Child Learn Science*, Washington, D.C.

This article contains information about science and science activities that can be done simply at home and at other sites. There are multiple suggestions for working with teachers and within the school system along with a list of science related sources that does include books, magazines, science camps and other information. It helps a parent discuss science and "find" science in the community where the family resides.

## Invitation to Learn

A pre-catapult launch – collect a variety of lever type objects such as paint sticks, plastic serving spoons, rulers and other items so that each small group of students will have one or more to try. Crumpled paper balls or giant marshmallows can be used for launching – in fact, both are preferable. The marshmallows must not be eaten but marked with the individual's initials, so that the missile may be reclaimed!

### Materials

- ❑ Launch mechanism
- ❑ Target
- ❑ Large marshmallow
- ❑ Paper
- ❑ 3x5 cards

## Instructional Procedures

1. The target is placed in the middle of the room
2. The children's desks are placed, equal distance from the target.
3. The students must remain sitting.
4. The "missile" must be touching the launching object before launch. It cannot be launched by hand.
5. The missile must be on the desk.
6. The children may set up the tools any way they wish.
7. Count to three and launch.
8. Provide a 3x5 index card.
9. After launch, introduce the word "lever." The main parts of the lever can be described; fulcrum, resistance force and effort force.

## Assessment Suggestions

- This is a participation project. If the children are involved, cooperating and participating in their groups; points may be awarded.
- 3x5 index card describing their design – drawing is acceptable.
- The correct use of the vocabulary; the drawing can be labeled.

### Materials

- ❑ 1 3x5 index card
- ❑ 3 large paper clips
- ❑ 1 bottle of liquid glue
- ❑ 10 tongue depressors or popsicle sticks
- ❑ 10 rubber bands of various size (I have many of these)
- ❑ 2 straws
- ❑ 1 plastic spoon
- ❑ 1 12 inch piece of string
- ❑ 1 pair of scissors
- ❑ 1 ruler; inches and metric
- ❑ 1 gallon size zip-lock bag (all materials go in here to give to the student groups)
- ❑ Target

## Curriculum Extensions/Adaptations/ Integration

### More Complicated Catapults

The students may use scissors, ruler and glue to help build the catapults, but they may not be part of the catapult itself. Allow the students to examine the contents of the bag and discuss the items and brainstorm before building; 5 minutes is a good amount of time. Allow the students to build for approximately 30 minutes and set a timer. As the students build ask them about their design and remind them of what the lever is and does. When the time is up, test the catapults! The target can be used again. Everyone will start the same distance from the target and the results will be measured and charted! Display their machines with the distance the paper or marshmallow flew. Add another experiment card to the Science Journal Pocket Folder, a photo of the machine is helpful.

## Family Connections

- Try building a catapult at home; how far can a potato be launched. What kind of materials would be required to move an item of this size and weight?
- Plastic spoons and frozen peas make mini catapults and will biodegrade in the back yard.

## Additional Resources

### Books

*Backyard Ballistics*, by William Gurstelle; ISBN 1-55652-375-0

### Web sites

http://www.knightforhire.com/catapult.htm

http://www.madison.k12.wi.us/toki/catapult.htm

http://www.science.howstuffworks.com/question127.htm

# Tissue Parachutes

*Science Standard IV*

*Objective 2*

Connections

**Standard IV:**

Students will understand that objects near Earth are pulled toward Earth by gravity.

**Objective 2:**

Describe the effects of gravity on the motion of an object.

**Intended Learning Outcomes:**

1. Science Process and Thinking Skills.
3. Understand Science Concepts and Principles

Content Connections:

Language Arts: Standard 8: Writing: Students will write daily to communicate effectively for a variety of purposes and audiences.

## Background Information

We have demonstrated that gravity is an extremely strong force with the use of muscles to fight gravity and dropping the rock and other items into the sand box. There are ways that the effect of that force can temporarily be reduced. Jets and prop-planes do make it into the atmosphere. Bubbles, seeds, pollen, dust and people can float for short periods of time.

## Research Basis

Bulloch, K. L. (2004). *The Mystery of Modifying: Creative Solutions*. Education Service Center

We need to modify instruction to suit different children and their differing learning styles. This article is "how to…" It lists the learning difficulty and provides suggestions of what to do before the lesson and during the lesson. There are many, many suggestions offered. If one does not work there are others to try.

## Invitation to Learn

The parachutes are simple to make and demonstrate the effect of gravity (pull) against the push of air. This exercise is extended by the use of a small fan which will increase the push or force of the air.

### Materials

- ❑ Tissue paper
- ❑ String
- ❑ Clear tape
- ❑ Small fan
- ❑ Mini chocolate bars
- ❑ 3x5 cards

## Instructional Procedures

1. Tape a piece of string to each corner of two parachutes.
2. Gather all four of the strings on each parachute and tape, along with a candy bar, all four ends together.

3. The piece of tissue paper can be folded into quarters, so that a peak at the center of the tissue paper can be held for release.
4. The parachutes can also be folded into quarters again and tossed into the air.

Notes:

- If the tissue squares are precut it will save time and frustration as the tissue is quite frail and it may be frustrating to those individuals who have small motor coordination difficulties.
- The pieces of string (100 percent cotton crochet thread is strong, light and inexpensive) were cut by a small group of children.
- The properly measured pieces (4) were taped to different places on a table. The children measured, cut and sorted the groups, using the string templates.
- The Science Pocket Folder has enough pockets that the items used in these experiments can be kept in the pocket folder as well.

## Assessment Suggestions

- After the experiments, the 3x5 cards will be completed and placed in the Science Pocket Folder, the following questions can be used as a guideline.
- Which parachute will come/came down first? Why?
- What happens when the force of wind (fan) is added to the activity?
- Does it change what happens to the parachutes? Why?

## Curriculum Extensions/Adaptations/ Integration

- Find out why and how birds fly and glide.
- List adaptations for learners with special needs.
- Include ideas for integration for other curricular areas (use appropriate subject area headings).

## Family Connections

- Fly a kite!

# Additional Resources

## Books

*The Dragon Kite,* by Nancy Lueen; ISBN-10:0152241973

*Wilbur and Orville Wright: The Flight to Adventure,* by Louis Sabin; Publisher; Mahwah, New Jersey: Troll Associates, 1983

## Web sites

http://www.readingrockets.org/about

http://wings.avkids.com/Curriculums/Birds/paper_kites.html